NOTE I.

MECOPTERA AND PLANIPENNIA OF INSULINDE

BY

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WITH BIOLOGICAL NOTES
FROM
EDW. JACOBSON.

Before my departure to Java I intended to give a monographic revision of the Neuropteroidea of Insulinde, but want of time and of sufficient materials forced me to give up this intention and I restricted it to the monographic revision of the Mecoptera and Planipennia, the two orders I studied with special attention since 3 years in behalf of the „Catalogue des collections du baron E. de Sélys Longchamps".

The territories that I name Insulinde are the Dutch colonies of the malayan and papuan archipelago. I describe also the species known from those parts of Borneo and New Guinea, that do not belong to the dutch possessions, as they very probably also will occur in them. Those of neighbouring countries are noted so far as they are important for comparison.

The materials studied are those of the Leyden Museum and some types of Gerstaecker from the Greifswald Museum, which Prof. G. W. Müller generously communicated to me and that facilitated this work very much. My best thanks for this courtesy, that enabled me to decide many questions about the systematic position of little known species. I had no time to work out materials of other museums, though I am acquainted with many fine new species from this territory. Only the described species that I saw in those Museums are here redescribed, though they are not represented in Leyden.

I am endebted for many interesting biological notes to my friend Edw. Jacobson in Batavia, whose accurate observations are very valuable contributions to the biology of these so neglected orders of insects. In future I hope to collaborate with him in the same agreeable way.

Though of little economic value the larvae of some species of *Chrysopa* and *Micromus* are observed by Dr. L. Zehntner to be useful by the destruction of Aphidae and Coccidae.

No doubt many species and genera will still be detected in these orders to which so little attention has been paid. Their biology also will surely give opportunity to many interesting discoveries.

Key to the orders.

The imagines are slender mediocre insects, with four equal, narrow wings, that have many furcated longitudinal veins, which scarcely are connected by some crossveins. In rest the wings are held horizontally, the forewings cover than the hindwings. The mouthparts are produced into a long beak, at the tip of which the short mandibles are inserted. Antennae very long and threadlike, nearly as long as the wings. Legs very long and slender, longer than the body. Body slender.

The larvae live, so far as is known, in the earth; they are carnivorous, with biting mandibles, and they pupate in the ground without cocon. Pupa libera.

MECOPTERA (PANORPATA).
Scorpionflies.

Imagines from moderately large to minute insects, with four nearly equal wings with a dense reticulated nervature, which are held rooflike in the rest. Mouthparts never forming a beak, only somewhat produced. Antennae varying from short clubs to long setae. Legs much shorter and thicker, shorter than the body. Body shorter or longer than the wings.

Larvae living on land, seldom in water, carnivorous, with long pierced mandibles with which they suck out their prey, consisting in other insects. Cocon always spherical, spun on leaves or in the ground. Pupa libera.

PLANIPENNIA.

PART I.

MECOPTERA.

(With 1 plate and 8 text-figures).

These curious insects are hitherto only known from Java and Sumatra, and all species belong to the genera *Panorpa* and *Leptopanorpa*, which are characteristic by the long abdominal segments of the male, the last one being produced into a cheliferous segment. No doubt the asian and australian genus *Bittacus* and the australian genus *Chorista* will also be found in some parts. So far as is known the species I enumerate here are collected in mountainous regions. Nothing is known about their biology and development.

Key to the genera.

Abdomen of the ♂ as long as the wings or somewhat longer, cheliferous segment sessile or very shortly pedunculate.
Panorpa Linné.

Abdomen of the ♂ much longer, about twice, than the wings, cheliferous segment longly pedunculate.
Leptopanorpa Mc. Lachl.

Genus *Panorpa* Linné (1758).

The malayan species of this genus are, so far the males are known, different by the curious process of the hindborder of the third tergit, which bears a very variable clubshaped prominency, that rests upon an elevation of the fourth tergit and which does not exist in the european species. I would propose for this group, that overleads to *Leptopanorpa*, the subgeneric name of *Neopanorpa*. The females are not different from those of european species.

The colours of the wings are like those of the european species, or they are less developed and may also wholly disappear. In the latter case the males have a long and slender abdomen and are only distinct from *Leptopanorpa* by the sessile ninth or cheliferous segment. In all species the subcosta joins the costa at the pterostigma in the forewings and in the hindwings about in the middle.

Key to the species.

Abdomen of the male as long as or scarcely longer than the wings. Wings more or less spotted with fuscous. A pterostigmatical crossband always developed . . 1

Abdomen of the male much longer than the wings, segments 7 and 8 long and very slender. Wings hyaline or with apical patch, no pterostigmatical dark crossband. 2

1. Apex of the wings fuscous. 3
Apex of the wings hyaline, a π-shaped pterostigmatical crossband . . . . *pi*, n. sp.

3. The pterostigmatical crossband connected with the apex, π-shaped, a crossband before the middle of the wing. Abdomen of the ♂ very long. . . *javanica* Westw.

The same crossband simple, apical patch with laterobasal prominency in the forewing. Abdomen of the male not longer than the wings. . . *angustipennis* Westw.

The same crossband simple, much narrower, apical patch quadrangular . . . . *mülleri*, n. sp.

As in *mülleri* but the crossband of the hindwings divided in two . . . . *ungaranensis*, n. subsp.

2. Wings unspotted . . . . . . *nematogaster* Mc. Lachl.

Wings with fuscous apex . . . . *jacobsoni*, n. sp.

Panorpa angustipennis Westwood.

(Plate 1, fig. 1, ♂).

Panorpa angustipennis Westwood, Transact. Ent. Soc. Lond. (2) I, p. 6 (1852). Java.

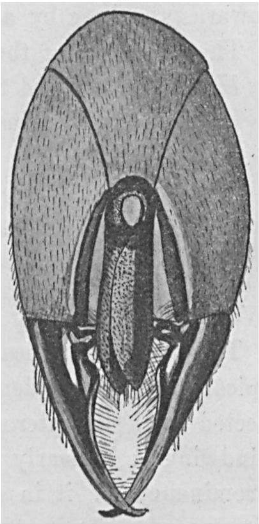
This species, described by Westwood from a female, remembers somewhat the european *communis* L. but has a much smaller size.

Black. Head black with very long black rostrum and yellow palpi with brown tips.

Antennae black. Head and dorsum of the thorax black. Breast redbrown. Legs brown. Abdomen black, the three last segments of the ♂ and the 5 first sternits, yellow. Third tergit of the ♂ at its hindborder with a small knobbed prominency that rests with its tip upon a carina of the fourth tergit.

Wings narrow, hyaline with black pattern. A broad pterostigmatical band reaches the hindborder in both wings and is connected along the foreborder with a quadrangular large apical spot, that has in the forewing an oblique distal prominency. In the forewings there is a small turned t-shaped spot in the middle, which does not touch the borders.

Fig. 1.



P. angustipennis Westw.
9th segment of ♂, underside.

The gonopoda of the ♂ (fig. 1) are interesting by the form of the genitalvalves which are long, slender and pointed at the tip. The branches of the forceps are nearly straight and have a broad obtuse dent at the base. The tips are slightly curved and crossing one another.

Body ♂ 13 mm., forew. 12$^1/_2$ mm., hindw. 11 mm.
gr. br. 3 mm., gr. br. 2$^1/_2$ mm.

Habitat: Java.

Westwood's description is made after a female. I examined one ♂ from Western Java, Preanger, collected by the well-known lepidopterist Mr. M. C. Piepers.

Panorpa javanica Westwood.

Panorpa javanica Westwood, Transact. Ent. Soc. Lond. (2) I, p. 5 (1852). Java.

This species is nearly related to *angustipennis* Westw. and of the same size. The differences are: a broad black crossband before the middle of the wing, a black point at the anterior border in the middle, a very broad π-shaped pterostigmatical patch, which is connected at the anterior border with the broad apical patch. The latter is bordered towards the base by a straight line.

The abdomen of the male is very long and slender.

Habitat: Java and Sumatra.

In the British Museum I saw in 1906 specimens from both islands.

Panorpa mülleri, n. sp.

Very similar and nearly related to *P. angustipennis* Westw., but differing from it in the following points:

The pterostigmatical fascia about half so narrow. The apical spot is considerably smaller and only narrowly connected with the pterostigma along the foreborder. In the hindwing it is nearly wholly separated from it. The distal prominency of it in *angustipennis* is only indicated by a right angle. The rest of the wing is hyaline.

Body, legs etc. as in *angustipennis*.

The gonopoda of the ♂ differ in the following points:

the ninth segment is broader and shorter, yellow, with a black forceps, the tips of which are crossed and more curved. The genital valves are black, yellow at the base, the apical parts are applied against one another and the tips are obtusely angulated.

Body ♂ 13 mm., forew. 14 mm., hindw. $12^{1}/_{2}$ mm.
♀ 9 mm., gr. br. 3 mm., gr. br. $2^{1}/_{2}$ mm.

Habitat: Java.

One male and four females from Java, collected by S. Müller, without indications of more special localities, and one female from Mount Ardjoeno in East Java, collected by Hekmeyer. The species is dedicated to its first collector.

Panorpa mülleri ungaranensis, n. subsp.

(Plate 1, fig. 2, ♀).

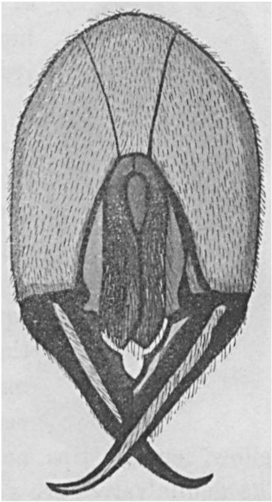
Different from typical *mülleri*-specimens by its smaller size. The rostrum about one fifth shorter and the palpi brown with black tips.

The colour of the breast is more bright fulvous, but the gonopoda (fig. 2) and other parts are as in *mülleri*.

The wings have the same pattern, but the pterostigmatical fascia it always incomplete in the hindwings, it is divided in two spots, the posterior one is paler and much smaller, nearly quadrangular.

The apical spot of the forewing has an obtuse angle and in the hindwing it is bordered by a straight oblique line.

Fig. 2



P. mülleri ungaranensis, n. subsp.
9th segment of ♂, undersid.

Habitat: Java.

I examined one male and four females from Central Java, Semarang Residency, collected in October 1905 by E. Jacobson on Mount Oengaran.

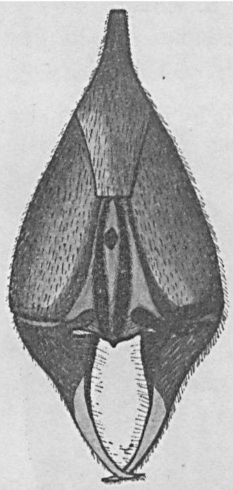
Panorpa pi, nov. spec.

(Plate 1, fig. 3, ♀).

About of the same size as *mülleri* but readily distinct from it by the following characters:

Head, rostrum and antennae shining black. Breast yellow to lightbrown, the dorsum brown to blackish brown. Legs yellowish brown. Abdomen black, reaching in the ♂ somewhat further than the tip of the wings.

Fig. 3.



P. pi, n. sp. 9th segment of ♂, underside.

Wings greyish hyaline, broad spatuliform at the tip, apical marking wanting, so that it is hyaline. Pterostigmatical marking in the form of the grecian character π, the apical leg of which has about one half of the length of the basal and not reaching the hindborder in the hindwing. Nervature redbrown.

In the ♂ the prominency of the third tergit is straight, about twice longer than in *mülleri*, slightly thickened at its tip and reaching about the middle of the fourth tergit, which is elevated. The segments 7 and 8 are equal, about once and a half longer than the sixth. The ninth (fig. 3) is blackish brown, narrow at its base, very broad at the tip. The forceps has yellow, curved tips and is not denticulated at the base. The genitalvalves are very long and narrow, little enlarged at the apex and reaching the base of the forceps.

Body ♂ 15 mm., forew. $12^{1}/_{2}$ mm., hindw. $11^{1}/_{2}$ mm.
♀ 10 » , gr. br. 3 » , gr. br. $2^{3}/_{4}$ mm.

Habitat: Java.

One couple from Central Java, Semarang Residency, Mount Oengaran, collected by E. Jacobson in October 1905.

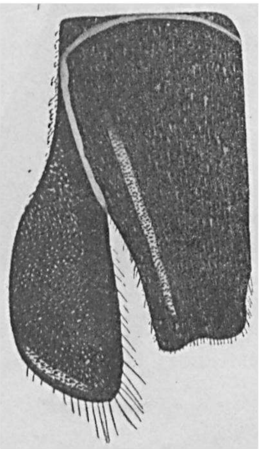
Panorpa nematogaster Mac Lachlan.

Panorpa nematogaster Mac Lachlan, Transact. Ent. Soc. Lond. 1869, p. 69, Pl. IV, fig. 12 (1869); l. c. 1875, p. 188 (1875). Java.

Head, antennae and abdomen black. Pronotum black with reddish lines at the sides of the hindborder. Meso- and metanotum redbrown. Breast read, with two small black points on each side. Rostrum reddish, with a dark broad stripe down the front. Palpi rufous, the apical joint black. Legs reddish, claws with two broad and blunt teeth internally below the apex. In the ♀ the breast and legs are more obscurely reddish, somewhat fuscescent. Wings very narrow, shining pale yellowish testaceous, without markings of any kind, with the exception of the narrow pterostigma which is slightly fuscescent; veins blackish, subcosta reaching to the pterostigma in the anterior wings, not so in the posterior wing.

Abdomen of the ♂ very slender; third tergit produced in the middle of its apical margin into a long slender curved process, slightly dilated at the extremity; fourth with a small tubercle; third, fourth and fifth nearly equal in length; sixth nearly twice the length of the fifth, gradually but slightly narrowed towards the apex, which is obliquely truncate; seventh and eighth each about twice the length of the sixth, very slender, the apex gradually dilated; ninth small, the forceps very long, the points curved and crossing each other; genitalvalves (fig. 4) short and thick, truncated at the apex, straight.

Fig. 4.



P. nematogaster Mc. L. Genitavalve of the ♂, lateral view.

Body ♂ 26 mm., forew. ♂ 13, ♀ 13½ mm., hindw. ♂ 12, ♀ 12½ mm.
♀ 11 〃 , gr. br. ♂ 2½, ♀ 3 〃 , gr. br. ♂ 2½, ♀ 2½ 〃 .

Habitat: Java.

The types are in the Oxford and British Museums; they are from Java and collected by Wallace. In the Leyden Museum are two couples from Java, collected by S. Müller, and one ♂ from Ambarawa, East Java, collected by Ludeking, which are identified by Mac Lachlan.

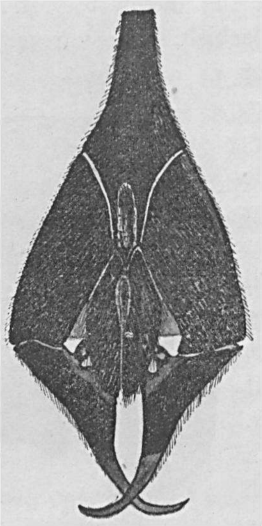
Panorpa jacobsoni, n. sp.

(Plate 1, fig. 4, ♂).

Nearly related to *nematogaster*, but readily distinct by the following characters:

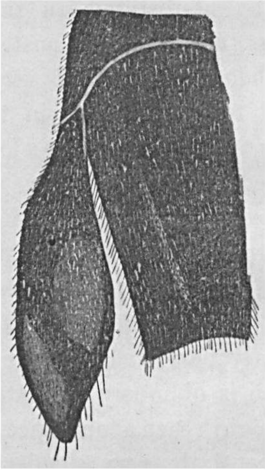
Smaller, the body of the same colour but the rostrum blackish brown, very narrowly yellow at the sides. Palpi brownish with black annulations and tip. Thorax yellow orange, the pro- and mesonotum blackish in the anterior half. Legs yellowish. The tarsi with dark annulations.

Fig. 5.



P. jacobsoni, n. sp.
9th segment of ♂, underside.

Fig. 6.



P. jacobsoni, n. sp.
Genitalvalve of ♂, lateral view.

Abdomen black in the ♂, the process of the third tergit is somewhat broader in its latero-basal part and the tubercle of the fourth is somewhat higher. The seventh and eighth segments are relatively shorter. The ninth (fig. 5) is somewhat shorter pedunculate and narrower, the tips of the forceps are more strongly crossed. The genitalvalves (fig. 6) are in lateral view narrower and acutely angulate at the tip.

The wings are of the same colour and form. The tips only are fuscous.

Body ♂ 20 mm., forewing ♂ $11^1/_2$ mm., hindw. ♂ 11 mm.
gr. br. ♂ $2^1/_2$ » , gr. br. ♂ $2^1/_4$ » .

Habitat: Java.

One male from Central Java, Semarang Residency, Mount Oengaran, October 1905, collected by E. Jacobson, is in the Leyden Museum. I dedicate this interesting species to its collector.

Genus *Leptopanorpa* Mac Lachlan (1875).

Transact. Ent. Soc. Lond. 1875, p. 187 (1875).

This genus is merely based upon the characters of the ♂ and is characterised by the slenderness of all parts. The body is very long, the basal segments of the abdomen are long, the 3 terminal ones very long and thread-like, the cheliferous segment is elongate-pedunculate. The wings are very narrow and the rostrum and legs are exceedingly long.

An approach and rather a transition to this genus form species as *P. nematogaster* and *jacobsoni*, but the ninth segment is here sessile or shortly pedunculate.

The typical species *ritsemae* and *sieboldi* occur in Japan, and in Insulinde this genus in represented by the following new species:

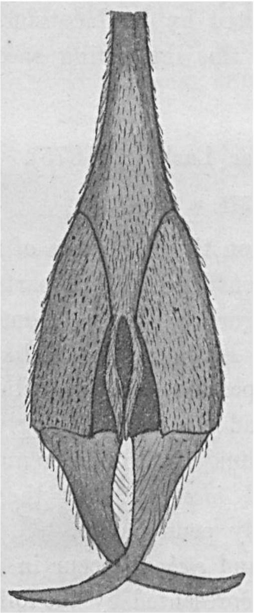
Leptopanorpa longicauda, n. sp.

(Plate 1, fig. 5, ♂).

This new species remembers in size and colour of the wings very much the *P. nematogaster* M. Lachl. It is different from it by the following characters: Rostrum wholly yellow, palpi reddish, the tip of the last joint black. Head black. Antennae brown except the two basal joints, which are reddish. Thorax blackish brown above, with two oval red spots on the meso- and metathorax. Breast yellow, with two pairs of black points at the sides. Legs reddish yellow with dark annulations of the tarsi.

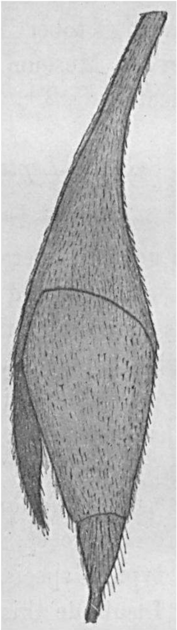
Wings pale yellowish testaceous, the subcosta joins the costa at the pterostigma in the forewing, in the hindwing however much before it. Pterostigma yellowish brown, scarcely visible. Nervature dark brown. Abdomen of the ♂ very long and slender, twice so long as the forewing, rufous brown, the sixth segment black in the basal half and the cauda yellowish. Prominency of the third tergit

Fig. 7.



Leptopanorpa longicauda, n. sp.
9th segment of ♂, underside.

Fig. 8.



Leptopanorpa longicauda, n. sp.
the same, lateral view.

straight, clubbed at the apex, which bears short black spines at its underside. The fourth tergit has a very slight elevation in the middle. Third, fourth and fifth segment equal in length, the sixth nearly three times longer than the fifth, the seventh and eighth three times longer than the sixth, and the ninth (fig. 7) longly pedunculate, the peduncle as long as the rest and the forceps together. Forceps strongly curved, with crossed tips. Genitalvalve (fig. 8) narrow and slender, with pointed tip.

Body ♂ 32 mm., forewing 14 mm., hindw. 12 mm.
Abd. ♂ 28 mm., gr. br. 3 mm., gr. br. $2^1/_2$ mm.

Habitat: Java.

One male, only indicated Java and collected by S. Müller.

A doubtfull species is still:

Panorpa charpentieri Burmeister.

Handb. Entomol. II, p. 958 (1839).

In the Leyden Museum is a female of a *Panorpa* from Java, named by Dr. S. C. Snellen van Vollenhoven *P. charpentieri*, which agrees very well with Burmeister's description; but as I have not seen the types, the description being very short and the locality the very general indication „Ost-Indien", so I doubt it is the real *charpentieri.*

There are in the Leyden Museum also fragments of another undescribed species from Java collected by S. Müller. No doubt the number of species, known from Insulinde, will considerably increase in future.

PART II.

PLANIPENNIA.

(With 4 plates and 14 text-figures).

Though as widely distributed as the MECOPTERA, this order of primitif insects contains much more species, belonging to the following families:

Antennae clubbed at the apex, longer or shorter . 1.
Antennae not clubbed at the apex . . . . . . 2.

1. Antennae short, rarely as long as head and thorax together. Wings with dense nervature, their apicalfield with many rows of oblique cells. — Larvae living in dry earth; running backwards and mostly making pittfalls (ant-lions). . . . . *Myrmeleonidae.*

Antennae very long, as long as the body. Wings much less densely reticulated, their apicalfield with 2—4 rows of large cells. — Larvae with 2 digitiform appendices at each abdominal segment; running forwards and not making pittfalls. . . . . *Ascalaphidae.*

2. Mouth produced into a short beak, hindwings very long and narrow, setiform . . . . *Nemopteridae.*

Mouth conical, hindwings of the same form as the forewings or only somewhat smaller and narrower, wanting in some species but never setiform . . . . . . 3.

3. Body and wings with a white exudation, nervature rather simple, but a few cross-veins; very minute forms. *Coniopterygidae.*

Body without a white exudation . . . . 4.

4. Anterior legs deformed to raptorial legs. *Mantispidae.*

All legs nearly equal . . . . 5.

5. One radial sector, parallel with the radius and forming the branches for the disc of the wing . . . . . 6.

Radialsector wanting and the branches emerging immediately from the radius, so that there seem to be many radialsectors . . . . *Hemerobidae.*

6. Antennae moniliform, short or moderately long, mostly shorter than the wings. . . . . 7.

Antennae setiform, very long and mostly thin. Body and wingvenation of a pale yellow green colour. Areolum simple . . . . *Chrysopidae.*

7. Antennae shorter than the body, thick, moniliform. Areolum large, bifid . . . . *Nymphidae.*

Antennae as long as the body or longer, thin. Areolum simple or with an incision in the middle. Ocelli developed or absent . . . . *Osmylidae.*

Ascalaphidae.

This family, to which the largest Planipennia belong, remembers by the colour and form of the wings much the Odonata and by the long clubbed antennae the Rhopalocera. As I have recently described it thoroughly in the »Catalogue des collections zoologiques du baron E. de Sélys Longchamps", I refer to this work for the species of Insulinde.

The biology and development are unknown of nearly all species and many new forms are surely to be detected.

Myrmeleonidae.

The Myrmeleonidae or Ant-lions are familiar to every entomologist by the curious habits of the larva which, living in dry earth or sand, goes backwards and makes often pittfalls to prey insects.

The imagines are nocturn, also prey on insects as nearly all other Planipennia and are characterised by the short, mostly broadly clubbed antennae, the elongate densely reticulated wings, which have the apicalfield with many rows of oblique cells. The postcosta of the wings, the length and form of the antennae, the legs and comparative length and form of the spurs are of most systematical value. The pattern of the head and pronotum are of much value to distinguish the species and their subspecies.

Key to the genera.

Male with the app. sup. developed into a forceps. Antennae very short, broadly clubbed. Wings short and rather broad, yellow, with many black irregular transverse lines on the forewing and ditto spots on the hindwing. Legs short and strong, posterior spurs as long as the two basal joints. . . . . . . *Tomatares* Hagen.

Male with the app. sup. short, valvular, never forming a forceps . . . . 1.

1. Hindwings shorter or scarcely longer than the forewings . . . . 2.

Hindwings much longer than the forewings, very elongate with acute curved tips. Nervature extremely dense. Antennae long, as long as head and thorax together, only little clavate at the tip. Legs short and strong, the spurs strong, a little curved, as long as the two basal joints. . . . . *Episalus* Gerst.

2. Antennae shorter than head and thorax together, more or less clavate. Wings hyaline, postcosta and ramus obliquus united in both wings. Tibialspurs as long as the metatarsus or shorter, the latter shorter than the last tarsal joint . . . . *Myrmeleon* L.

Wings spotted with dark points, antennae as long as head and thorax together or longer, more or les clavate . . . . 3.

3. Wings nearly equal in length, the hindwings a little shorter. Membrane with spare white and brown markings. Antennae long, scarcely enlarged towards the apex. Legs very long and slender, the metatarsus very long, nearly as long as the other joints together, tibial spurs thin and feeble, unequal, the exterior one as long as the metatarsus, the interior about two thirds of it. Last joint with many black spines, especially at the underside.
Paraglenurus, nov. gen.

Wings about as in *Paraglenurus*, antennae longer and more clavate, abdomen of the ♂ as in the foregoing genera shorter than the wings. Legs short and strong. The metatarsus scarcely longer than the other joints. Spurs strong, curved, as long as the 4 basal joints. Last joint longer than the others together, with long, almost straight claws. *Formicaleo* Leach.

Nearly related to *Formicaleo* but distinct by the longer abdomen of the male, being as long as the wings, which are broader towards the somewhat curved tips. Tarsi very long. The metatarsus and last joint nearly equal in length, as long as the 3 intermediate joints together. Spurs straight, as long as the metatarsus. Claws with an interior dent near the tip. Four rows of spines on the underside of the last joint. . *Pseudoformicaleo*, nov. gen.

Genus *Tomatares* Hagen (1866).

Hagen, Stett. Ent. Zeit. XXVII, p. 372 (1866).

This genus is allied with the larger african Myrmeleonidae as *Palpares*, *Crambomorphus* etc. It has the general form of *Palpares*, but is much smaller in size. The wings are rather broad, with a dense pale nervature. The antennae are short, nearly as long as the head is broad. The tarsi are short, with the joints equal in length, only the last joint is longer. The tibialspurs are as long as the two basal tarsal joints. Colour of the body yellow with dark markings, that of the wings pale yellow with black transverse lines in the forewings and some at the apex of the hindwings. Male with the app. sup. long and forming a forceps.

Habitat: Africa and South Asia.

The species inhabiting Insulinde is:

Tomatares pardalis (Fabricius).

Myrmeleon pardalis Fabricius, Spec. Ins. p. 393, n°. 2 (1781), Coromandel; Mant. Ins. p. 249, n°. 2 (1787); Ent. Syst. II, p. 92, n°. 2 (1793). — Gmelin, Syst. Nat. Ed. XIII, p. 2643, n°. 7 (1793). — Olivier, Encycl. Méthod. VIII, p. 122, n°. 8 (1825). — Donovan, Insects of China (1798). — Walker, Cat. Brit. Mus. Neur. p. 405, n°. 192 (1853).

Tomatares pardalis Mac Lachlan, Ent. monthl. Mag. XX. p. 184 (1884).

Myrmeleon compositus Walker, Cat. Brit. Mus. Neur. p. 397, n°. 166 (1853), North India, North Bengal.—Mac Lachlan, Journ. Linn. Soc. Zool. IX, p. 281 (1867).

Antennae very short, with a broad club; black, the basal third rufous.

Head moderately broad, orange, a broad shining black line above the antennae and a ditto spot between the antennae connected with it. Vertex unicolorous. Prothorax much broader than long, with three black points which are often connected to a black transverse band. Meso- and metathorax of the same colour, each with a shining black spot on the scutellum. Breast of the same colour as the dorsum, with black spots and lines between the coxae. Legs rather short and strong, the femora yellow with an exterior black line, the tibiae black, excepted the base which is yellow, tarsi black. Spurs black, strongly curved, as long as the first tarsal joint. Claws long, black. Abdomen of the ♂ a little shorter than the hindwing, that of the female shorter, yellow, the tergits with black broad lateral stripes, the third tergit in the male nearly black with dense erected brown hairs. Venter yellow with a dark longitudinal stripe in the middle. The male with two slightly curved, yellow app. sup. which are about as long as the penultimate segment.

Wings moderately long and broad, similar in shape, cream to yellowish white with white nervature. The forewings with many very irregular, more or less connected, narrow, black transverse lines and in the costalfield are blotches of the same colour. In the hindwing there is only a dark spot in the middle and some stripes at the apex. The pattern is very variable. The pterostigma is white in both wings. The male has a small sepiabrown pelotte.

Body ♂ 36 mm., forew. 32 mm., hindw. 31 mm., ant. 4mm.
Abd. ♂ 27 mm., gr. br. 10 mm., gr. br. 9$^1/_2$ mm.
App. ♂ 2$^1/_2$ mm.

Habitat: India and Java.

The type is described from Coromandel. Walker described it under the name *compositus* from North India and North Bengal. I saw in the British Museum a specimen collected by Dr. Horsfield in Java.

Probably this is still a different subspecies of the continental form, but as the species also occurs nearly undifferentiated in Africa (*clavicornis* Latr.) it is better to decide this question with more material.

Echthromyrmex orientalis Mac Lachlan.

Mac Lachlan, Ann. Soc. Ent. Belg. XVI, p. 143 (1873). Moluccas.

I saw the type in the collection de Sélys in Brussels and no doubt the mentioned locality is wrong, as there is in the same collection a quite similar specimen from Burmah. As the other species of this genus, *E. platypterus* Mc. Lachl., is from Bagdad and as I saw an undescribed species from Ceylon in the British Museum, I presume that it does not extend so far as Insulinde.

Genus *Formicaleo* Leach (1815).

Leach, Edinburg Encycl. IX, p. 138 (1815).

This genus has the tarsi analogous with *Tomatares*, but the spurs are much longer (as long as the four basal joints); the last joint is much longer. The antennae are longer than head and thorax together and clubbed at the apex. The wings are hyaline, spotted with some dark atoms, and about equal in length, long and narrow. Gonopoda of the ♂ short and the app. sup. valvular.

This genus occurs in all parts of the world. In Insulinde it is represented by the following widely spread species:

Formicaleo audax (Walker).

(Plate 2, fig. 6).

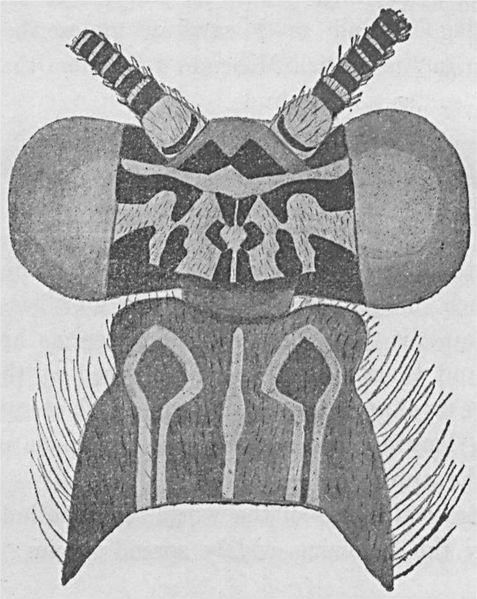
Myrmeleon audax Walker, Cat. Brit. Mus. Neur. p. 338, n°. 64 (1853). Nepaul.
» *gravis* Walker, l. c. p. 339, n°. 65 (1853). Ceylon.
» *vafer* Walker, l. c. p. 345, n°. 73 (1853). N. S. Wales.

Myrmeleon dirus Walker, l. c. p. 346, n°. 74 (1853). Ceylon.
„ *lentus* Walker, l. c. p. 346, n°. 75 (1853). East Indies.
„ *desperatus* Walker, l. c. p. 359, n°. 98 (1853). New Holland.
„ *perniciosus* Walker, l. c. p. 360, n°. 99 (1853). ?
„ *malefidus* Walker, l. c. p. 364, n°. 108 (1853). v. Diemensland, N. Holl.
„ *acutus* Walker, l. c. p. 377, n°. 134 (1853). New Zealand.
„ ? *insomnis* Walker, l. c. p. 385, n°. 147 (1853). ?
Formicaleo morpheus Kirby, Monogr. Christmas Isl. p. 140, t. 14, f. 3 (1900). Christmas Island.
? *Formicaleo longicornis* Brauer, Novara Exp. Zool. II, Neur. p. 42 (1865). Sambelong, Nicobars.

Antennae black, narrowly annulated with yellow. Apex only a little enlarged.

Head as broad as the mesothorax, the underside, mouthparts and labrum yellow. Tips of mandibles black. A black stripe between and two black triangles above the antennae. Vertex luteous, with two rows of black markings (fig. 9), which are often somewhat covered by a grey exudation. Occiput brown. Prothorax brown with three luteous stripes, the median one very fine and narrow, the lateral ones irregular. Meso- and metathorax brown, with irregular yellow spots. Breast luteous, brown at the sides, covered all over with a grey exudation and with short white hairs.

Fig. 9.



Formicaleo audax (Walk.).
Head and prothorax of ♂, upperside.

Legs short and stout, luteous to brown, with white hairs and black spines. Femora brown above, luteous beneath. Coxae luteous. Tibiae luteous beneath, densely spotted with black above. Tarsi black, the articulations and the base of the basal and apical joint red. Claws very strong, red, black at the tip. Spurs curved, black at the tip, as long as the first four tarsal joints.

Abdomen long and stout, shorter than the wings. Dorsum brown with four luteous markings, viz.: a quadrangular one at the frontborder, almost connected with a triangular one at the hind border, which occupies more than one half of the segment, and two lateral round ones about at the middle. In the posterior segments they are connected to a luteous cross, but often the abdomen shows no light markings by decomposition of the entrails. Venter luteous with a broad darker median line.

Gonopoda very short and inconspicuous, the male with a very small triangular genitalvalve and short valvular app. sup.

Wings elongate and narrow with acute tips, the posterior as long as, but narrower than the anterior ones. Nervature not very dense, all veins spotted with white, the longitudinal veins show this very clear, especially the subcosta and radius. Costalveins simple, only some of them before the pterostigma are forked. Pterostigma whitish, oval, small, with a dark spot at the junction of radius and subcosta, which spot is larger in the forewings and much more distinct. Apical part with pale oblique lines where the veins are white and with broadly brown suffused gradate veins, forming 2, 3 or more rows in the forewings, in the hindwings they are much less distinct and often absent. The postcosta and ramus obliquus of the forewings are distinctly united and at their junction often a brown spot is to be seen that is very large in some individuals. In the hindwings the ramus obliquus is very short and the subcosta does not reach it; there is no dark spot at this place. A pelotte is not developed.

The dimensions of the species vary much, also the colours of wings and body depending from the state of maturity.

Body 27—35 mm., forew. 31—38 mm., hindw. 31—38 mm., ant. 7—11 mm. abd. 20—25 mm., gr. br. 6—8 mm. gr. br. 5—7 mm.

Habitat: India, Ceylon, China, Japan, Insulinde, Australia, van Diemensland and New Zealand.

This species is so extremely variable, that I believe it impossible to distinguish subspecies with certainty. All variations occur in the different localities from which I saw materials.

After the localities the following subspecies are probably to be distinguished:

Formicaleo audax audax (Walker).

This is synonymous with *lentus* Wlk. and the form of Continental India.

Formicaleo audax gravis (Walker).

Synonymous with *dirus* Wlk. and the form of Ceylon.

Formicaleo audax vafer (Walker).

Synonymous with *desperatus* Wlk. and the form of Australia. Probably *perniciosus* Wlk. and *insomnis* Wlk., of which no fatherland is known, belong also to this form.

Formicaleo audax malefidus (Walker).

This is the form of van Diemensland, the specimens from New Holland belong to *vafer* Wlk.

Formicaleo audax acutus (Walker).

Is the more aberrant form of New Zealand.

Formicaleo audax morpheus Kirby.

Can probably be separated as the form of Christmas Island, south from Java.

I examined a pretty series from Insulinde from the following localities:

Banka, two females collected by Teysman and Budding.

Java, one specimen collected by S. Müller, one male collected by Mr. M. C. Piepers, one male from Ambarawa, Central Java, collected by Ludeking and one small male collected in Semarang by Edw. Jacobson.

Flores, one small incomplete specimen collected by Ludeking.

Wetter, one very small ditto specimen collected by Schädler in 1898.

New Guinea, one male from Dutch North New Guinea, Sentani lake, 1—19 Aug. 1903, collected during the expedition of Prof. Wichmann. I further saw two specimens from the German territory, Friedrich-Wilhelmshafen, presented by H. Fruhstorfer, and moreover a female from the Philippines, Mindoro, Dec. 1894, A. Everett (coll. v. d. Weele).

I doubt if *longicornis* Brauer, from the Nicobars, is a form of this species, as some expressions in the description seem to point out some characters that I cannot find in my series, but it may be that they are individual. Without a re-examination of the type this question can not be decided.

Formicaleo schädleri, nov. spec.

(Plate 2, fig. 7, ♂).

This form is only provisionally brought into this genus because it has the form of the antennae and characters of the legs of the species of this genus, but in the wings it should rather be a *Myrmecaelurus* or a new genus.

Antennae longer than head and thorax together, yellow, with very short black hairs, and brown at the broad tip.

Head yellow at the underside, mouthparts and labrum; a shining black cross-stripe under the antennae. Vertex (fig. 10) with two nearly round black spots, occiput luteous with four small brown points.

Thorax dark brown above, with many small luteous markings and stripes. Breast yellow with dark brown points and stripes.

Legs yellow, very stout and rather short, with black spines, the tips of the tibiae black.

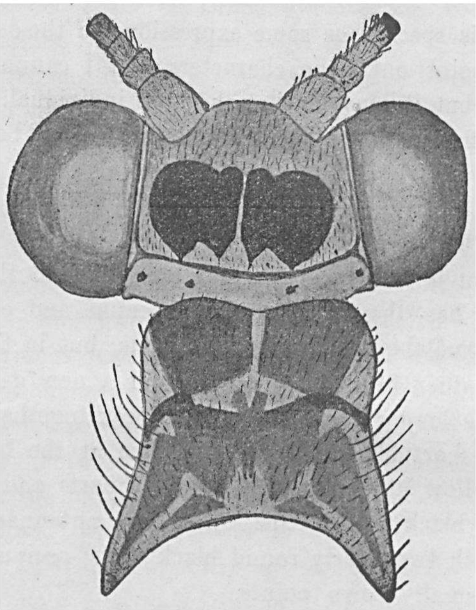
Tarsi short, with dark tip of the last joint and dark claws. Spurs black, strongly curved, each pair forming an oval, as long as the 4 basal tarsal joints.

Abdomen partly damaged, the basal tergits with the anterior half yellow, with a brown spot in the middle and the posterior part brown. Underside yellow, with narrow brown lines at the end of the sternits.

Gonopoda yellow, very inconspicuous in the male.

Wings broad, rounded at the tip, hyaline with open nervature. The longitudinal veins yellow, striped with brown. The crossveins in both wings brown, bordered with brown and consequently very distinct. Costalveins simple, only 4—6 before the pterostigma are forked. Pterostigma small, oval, cream-white with a dark spot at its base in both wings. Some crossveins of the discal area are more distinctly bordered with brown and at the junction of the cubitus is, in both wings, an indistinct brown spot. The pelotte wants.

Fig. 10.



Formicaleo schädleri, n. sp.
Head and prothorax of ♂, upperside.

Forewing 36 mm., hindw. 38 mm., ant. $9^1/_2$ mm.
gr. br. 10 mm., gr. br. 8 mm.

Habitat: Island of Kisser near Timor.

One male, with partly damaged abdomen and collected on the island of Kisser by K. Schädler, to whom I dedicate this interesting species.

There are australian species in the British Museum and in my own collection, which are somewhat allied to it. No doubt it has an australian origin, so as the general fauna of these islands has.

Pseudoformicaleo, nov. gen.

Nearly related to *Formicaleo* but different in the following characters:

Antennae somewhat shorter. Abdomen of the ♂ longer than in the ♀, longer than the forewings.

Legs with long tarsi, the basal and apical joint very long, equal in length, as long as the 3 intermediate joints, the spurs long and straight, as long as the basal joint, the apical joint with 4 rows of spines at the underside and the claws with an obtuse dent.

Wings as in *Formicaleo*, but the tips acutely angulated and somewhat curved.

Habitat: Africa and Asia.

To this genus belongs the widely spread *Myrmeleon gracilis* Klug that occurs in Asia and Africa.

In Insulinde the following new species occurs:

Pseudoformicaleo jacobsoni, nov. spec.

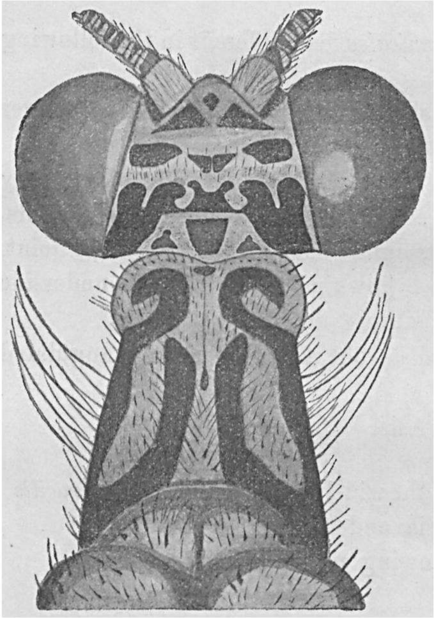
(Plate 2, fig. 8, ♀).

Antennae scarcely longer than head and thorax together, black, narrowly annulated with yellow, the basal joint yellow with short white hairs. Head scarcely broader than the thorax; underside, mouthparts and labrum yellow, tips of mandibles and labialpalpi brown. A brown crossband beneath the eyes, above them three black spots which are more or less connected by dark colour. Vertex (fig. 11) with a grey exudation and two rows of black markings. Occiput paler, with brown markings. Eyes black-brown.

Prothorax very long and narrow, dark plumbeous with a grey exudation and with indications of a curious dark pattern; meso- and metathorax of the same colour, with long black hairs and spotted with black and yellow. Breast plumbeous with a grey exudation.

Legs stout and long, with black spines and long white hairs. Coxae red, femora black with red base, tibiae shining black with two red annuli. Tarsi very long, longer than the tibiae; the metatarsus very long, somewhat longer than the following 3 joints together, yellow with a black tip, the following 3 joints black with two spines at the underside, the last joint nearly as long as the metatarsus, yellow at the base, with 4 rows of short black spines at the underside. Spurs red, straight, as long as the metatarsus. Claws curved, large, at the underside with an obtuse dent at the base and before the tip.

Fig. 11.



Pseudoformicaleo jacobsoni, n. sp.
Head and prothorax of ♀, upperside.

Abdomen plumbeous, very long, in the female a little shorter than the hindwing, in the male longer than the forewing, with spare short white hairs.

Gonopoda indistinct, very short in both sexes.

Wings nearly equal in size, the hindwing somewhat narrower, hyaline. The longitudinal nervature about as in *F. audax* (Wlk.), but the crossveins very distinct and dark, especially on the disc of the forewing and here alternating with spaces of a nearly white longitudinal nervature. Pterostigma very long, whitish, a black spot at the base and tip in the forewing. A brown margined crossvein at the junction of the cubitus and a less distinct one at that of the ramus obliquus and the postcosta in the forewing. In the hindwing these are absent and the ramus obliquus is scarcely developed. The costalveins are all simple and the costalfield equal in breadth. The tips are very acute, the hindborder a little incised, so that they seem to be curved. There is no pelotte developed.

Body ♂ 28, ♀ 25 mm., forewing 22—24½ mm., hindw. 20—22 mm., ant. ♂ 5½ mm.
Abd. ♂ 23, ♀ 19 mm., gr. br. 4½—5½ mm., gr. br. 3½—4 mm., ♀ 6 mm.

Habitat: Java.

I examined three specimens, one ♂ and two ♀♀, from Central Java, Semarang, collected by Edw. Jacobson, to whom I dedicate this species.

Pseudoformicaleo jacobsoni wetterensis, nov. subsp.

A female from the island of Wetter differs from de javanese specimens by the pattern of the vertex: the black lateral markings of the posterior row are confluent and the median one is not corned but trapeziform.

Habitat: Island of Wetter.

One specimen, a female, collected by K. Schädler.

Genus *Episalus* Gerstaecker (1884).

Gerstaecker, Mitt. Naturw. Ver. Neu-Vorpomm. und Rügen, XVI, p. 19 (1884).

This genus is easily recognisable by the inequal wings, the anterior pair being broad with obtuse apex, the posterior longer, much narrower, with elongate, acute apex, that is strongly curved. The antennae are about as long as the head and thorax together, the legs short and strong with the spurs as long as the two basal joints. The basal tarsal joint is about one half longer than the 3 following ones.

Habitat: Duke of York Island and New Guinea.

The unique species known is:

Episalus zephyrinus Gerstaecker.

(Plate 2, fig. 9, ♀).

Gerstaecker, Mitt. Naturw. Ver. Neu-Vorpomm. und Rügen, XVI, p. 20 (1884). Duke of York Island.

Though this curious and beautiful species is hitherto only known from Duke of York Island and German New Guinea, no doubt it will also occur in Dutch New Guinea.

Antennae black, the two basal joints brown, about as long as thorax and head together, apex only a little dilated.

Head not very broad; underside, mouthparts and labrum yellow to brown. Vertex and dorsum of the body earthbrown, without any pattern except an inconspicuous trace of a yellowish median line on the pronotum. Breast pale yellowish.

Legs short and slender, yellowish, tarsi and tips of tibiae deep black, with short black spines. Tibiae pale yellow, femora of the same colour, the anterior however with a broad black interior line, the median wholly black, the posterior are more slender and pale yellowish. The spurs are black, nearly straight and as long as the four basal tarsal joints.

Abdomen much shorter than the wings, equal in length in both sexes, without villosity, earthbrown above, paler beneath, the basal segment yellow like the breast.

The gonopoda are very short and inconspicuous.

Wings hyaline, nervature white and very dense, the forewing broad with broad tips and spotted with many very small, brown atoms which form two indistinct rows in the costalfield of the forewing. There also is a remarkable brown margin at the hindborder of the forewing, which comes from the base and goes to the junction of postcosta and ramus obliquus, where it finishes in a black point. It is connected with the black shoulders by the black analvein and its branches. There is a black streak at the tip of both wings, which is longer in the hindwing and separated in many points. The apical half of the hindmargin is bordered by a black line of small joined points. The costalveins are very numerous and simple, with the exception of those near the pterostigma and towards the apex, which are forked. When seen on a dark underground the wings are broadly margined with a milky white troubling and there are two curved white lines on the disc of both wings, one above and the other beneath the cubiti, which are convergent but not joined at the tips. They indicate the remarkable grooves of the wings. The pelotte is not developed, but in both sexes there is at the hindwing a dark margined line at its place.

Body ♂ 40, ♀ 42, forew. 51—52 mm., hindw. 60—61 mm., ant. 10½ mm.
Abd. ♂ 30, ♀ 32, gr. br. 16—17½ mm., gr. br. 13—14 mm.

Habitat: Duke of York Island and German New Guinea. I only examined specimens from German New Guinea, Friedrich Wilhelmshafen, coll. H. Fruhstorfer, and from Stephansort, Astrolabe bay, Kunzmann coll., from Neervoort van de Poll's collection (coll. v. d. Weele).

Paraglenurus, nov. gen.

Though nearly related to *Glenurus* it is distinct from it by the relative length of the wings, as the hindwings are a little shorter and narrower than the forewings, in *Glenurus* the former are longer. The membrane is spotted with some brown and white markings as in *Formicaleo*, but more distinct. Legs very long and slender; the metatarsus very long, nearly as long as the other joints together; tibial spurs thin and feeble, inequal, the exterior one as long as the metatarsus, the interior one about two thirds of it. Apical joint of the tarsi with many black spines especially at the underside.

Habitat: Ceram and Borneo.

The type of the genus is *P. scopifer* (Gerst.).

Paraglenurus borneënsis, nov. spec.

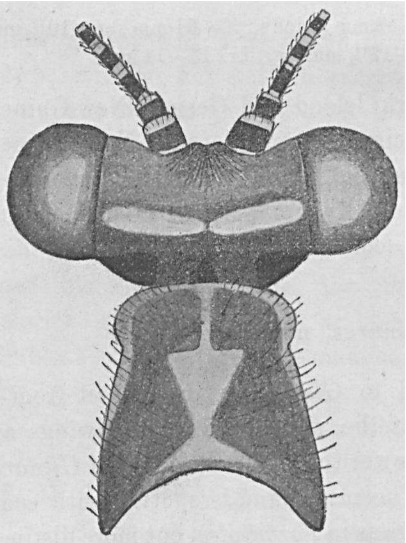
(Plate 3, fig. 10, ♀).

This species is so similar in form and pattern of the wings with *F. audax*, that the characters of the head and legs are practically the only characters to distinguish them.

Antennae nearly as long as head and thorax together, scarcely enlarged at the apex, black, with narrow yellow annulations.

Head yellowish at the underside, also the mouthparts, labrum and face; between the antennae dark brown. Vertex (fig. 12) but little elevated, with a somewhat interrupted broad carina in the middle and three dark spots on the occiput.

Fig. 12.



Paraglenurus borneënsis, n. sp.
Head and prothorax of ♀, upperside.

Thorax brown above and at the sides, above with some paler markings. Breast yellow.

Legs very long and slender, yellow, with short black spines, the femora and tibiae externally spotted with black. Tarsi yellow, the apical 3 joints black. The metatarsus nearly as long as the following joints together. No tibial spurs (probably broken off in the unique specimen) or only small rudiments at the base of the metatarsus. Claws very long, yellowish. Last joint with black spines, especially at the underside.

Abdomen dark brown above, with narrow yellow lines at the hindborders and a broad transverse band somewhat before the middle. Venter paler brown with narrow yellow hindborders. Gonopoda yellow, inconspicuous.

Wings nearly equal in length, the hindwings somewhat shorter and narrower. Tips acute. Nervature coloured as in *F. audax.* Pterostigma, gradate veins, spot at the junction of postcosta also coloured. Costalveins simple. A brown spot at the junction of the cubiti in both wings. The margin of both wings at the tip and the hindborder narrowly clouded with grey at the numerous veins.

Body 30 mm., forew. $33^1/_2$ mm., hindw. 22 mm., ant. $7^1/_2$ mm. Abd. 21 mm., gr. br. 8 mm., gr. b. $6^1/_2$ mm.

Habitat: Borneo.

I examined a somewhat immature female from Liang-Koeboeng West, April 1894, collected by Dr. J. Büttikofer.

Paraglenurus scopifer (Gerstaecker).

(Plate 3, fig. 11, ♀).

Myrmeleon scopifer Gerstaecker, Mitt. Naturw. Ver. Neu-Vorpomm. und Rügen, XIX, p. 110 (1888). Ceram.

This species is nearly related to *borneënsis*, but the differences seem too conspicuous to be of a subspecific value. It much resembles *Glenurus japonicus* Mac Lachlan from Japan.

Head and body as in *borneënsis*, but the legs are stronger though of the same length. The ends of the femora brown, the tips of the tibiae and tarsal joints black. The last tarsal joint wholly black, with many black spines all around, but most distinct at the innerside. Claws red, long, straight, directed inwards. Spurs of the posterior tibiae brown, inequal, the outer as long as the first tarsal joint, the inner about two thirds of it.

Wings as in *borneënsis*, but nearly hyaline, the nervature rather dark. A large brown lunulus at the junction of the postcosta and the ramus obliquus in the forewing, and in both wings a dark brown spot before and behind the pterostigma, the apical border broadly infuscated, the infuscated portion pale. A brown spot at the junction of the cubiti and another oblique one in the apical field. The two latter are larger and more distinct in the hindwings.

Body 23 mm., forewing 31 mm., hindw. 30 mm., ant. 8 mm.
Abd. 16 mm., gr. br. 8 mm., gr. br. $6^1/_2$ mm.

Habitat: Ceram.

I only saw the type, a ♀, collected in Ceram by Ribbe.

Genus *Myrmeleon* Linné (1767).

Linné, Syst. Nat. Ed. XII, p. 913 (1767).

The species of this cosmopolitan genus are characterised by the short clubbed antennae, which are mostly shorter than the head and thorax together. The legs are short and strong, with the basal tarsal joint or metatarsus but little longer than the following and the spurs straight and as long as it.

The wings are equal in length, with acute tips and hyaline membrane.

From Insulinde three species are known, two of them are divided in many subspecies.

Myrmeleon sagax Walker.

(Plate 3, fig. 12).

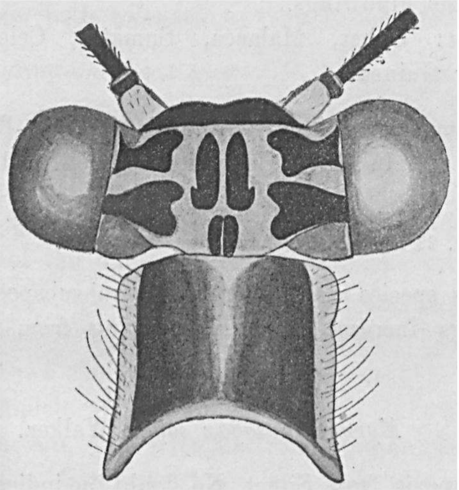
Myrmeleon sagax Walker, Cat. Brit. Mus. Neur. p. 382, n°. 142 (1853). Silhet.

This species is distinguished from *frontalis* and *acer* by its larger size, paler colour of the legs and of the underside of the body and by the slender antennae, which are only scarcely or not at all clubbed.

Antennae black, about as long as the head and thorax together; the basal joint yellow at the tip and base. Underside of the head and the mouthparts yellow, tip of mandibles black. Labrum yellow with two round darks spots. Frons yellow, with a semicircular black spot that is connected with the surrounding black streak of the antennae. Vertex arched, from yellow to dark brown, with black markings about as in fig. 13. Occiput dark.

Thorax dark brown above, with luteous markings. Breast yellow, with a broad shining black line at the pleurae. Pronotum with luteous lateral borders and a narrow yellow streak along the middle.

Fig. 13.



Myrmeleon sagax celebensis, n. subsp.
Head and prothorax of ♂, upperside.

Legs rather short and thick, yellow, with dark markings at the upperside of the femora, innerside of the tibiae and the annulations of the tarsi. Spurs straight, yellow, nearly as long as the metatarsus.

Abdomen shorter than the wings, brown at the upperside, yellow beneath.

Gonopoda of the ♂ very short, the genitalvalve yellow, tongue-shaped, the app. sup. brown, the valves simple and short.

Wings long and rather broad, the hindwings longer, with lanceolate, somewhat curved tips.

Membrane hyaline, with green to bluish iridescence. Nervature very dense, subcosta and radius yellow, the other longitudinal veins brown, the crossveins dark brown and so dense at the borders of the tips, that these appear to be margined with pale brown. Costalveins simple in both wings, in the forewings they form two rows at about one sixth before the pterostigma and in the hindwings there are some bifurcated ones before it. Pterostigma small, white, oval, not touching the foreborder, in the hindwings very small.

The pelotte is only developed as an acute lobe at the base of the hindwings.

Habitat: Silhet, Malacca, Sumatra, Celebes, Ceram and New Guinea.

The dimensions of a ♂ from Tenasserim, Dawnat hills, 2000 ft., 22. IV. 1897, Col. Bingham (coll. v. d. Weele) are:

Body 29 mm., forew. 35 mm., hindw. 37 mm., ant. 8 mm.
Abd. 22 mm., gr. br. 8½ mm., gr. br. 7½ mm.

In this species we distinguish several subspecies, in which the wings increase in breadth going from the West to the East.

Myrmeleon sagax sagax Walker.

The type is from Silhet. No doubt the indication 12 lines (25 mm.) for the body is wrong. The above mentioned specimen from Tenasserim does not differ from the type.

Myrmeleon sagax sumatrensis, nov. subsp.

Much resembling *sagax sagax*, but the median markings of the head somewhat broader. The dimensions are the same as in the typical form. One female collected by Dr. B. Hagen in Tandjong Morawa, Serdang, North East Sumatra.

Myrmeleon sagax celebensis, nov. subsp.

(Plate 3, fig. 12, ♂).

Distinct from *sumatrensis* by the broader wings, which are shorter and about $1^1/_2$ mm. broader. The basal joint of the antennae is yellow (fig. 13). The median markings of the head are narrower and those of the thorax are larger and rather stripe-like. Basal third of the underside of the antennae pale yellowish.

Body 31—35 mm., forew. 35—37½ mm., hindw. 37—39 mm., ant. 7½—8 mm. Abd. 23—27 mm., gr. br. 10—10½ mm., gr. br. 8—8½ mm.

Habitat: Celebes.

I examined two males, one from Gorontalo, the other from Panybie, both collected by von Rosenberg.

Myrmeleon sagax papuensis, nov. subsp.

Nearest to *celebensis*, but with still broader wings. Face and vertex black, the markings very indistinct. Pronotum with the median line only developed in the anterior part and two oblique yellow pointlike lines on each side of the disk. Two thirds of the underside of the antennae yellow.

Body 35 mm., forew. 37—39 mm., hindw. 38½—41 mm., ant. 7½—8 mm. Abd. 27 mm., gr. br. 10½—11 mm., gr. br. 9—9½ mm.

Habitat: New Guinea.

One incomplete male from Dutch New Guinea, collected by Dr. Bernstein, and a female from German New Guinea, Astrolabe bay, Stephansort, collected by Kunzmann in 1894, from the collection Neervoort van de Poll (coll. v. d. Weele).

No doubt this species also occurs in Java. I saw very incomplete specimens, collected according to the labels by Dr. S. Müller in that island, which are very near to *papuensis* and probably from New Guinea, as I found in the collection of Lepidoptera that his captures from Java and New Guinea have been mixed and wrongly labelled.

I also saw debris of a specimen collected by Dr. J. Büttikofer in Borneo, and there is in the collection a very immature incomplete specimen from Ceram, collected by Ludeking, which is near to *papuensis* but different. It is however too bad for description.

Nothing is known about the biology and development of this species.

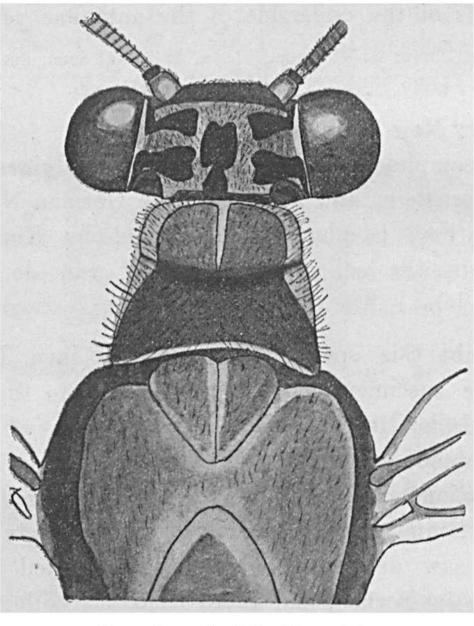
Myrmeleon frontalis Burmeister.

(Plate 3, fig. 13, ♀).

Myrmeleon frontalis Burmeister, Handb. Entom. II, p. 993 (1839), Java; Walker, Cat. Brit. Mus. Neur. p. 401, n°. 175 (1853); Hagen, Stett. Ent. Zeit. XXVII, p. 439 (1866).

Antennae black, nearly as long as head and thorax taken together, the two basal joints yellow-annulated. Head rather broad, underside and mouthparts yellow, labialpalpi moderately long, fusiform, brown in the apical half. Frons deep shining black, vertex black, with remarkable yellow pattern (fig. 14). Eyes hemisphaerical, bronze, surrounded with a narrow yellow line.

Fig. 14.



Myrmeleon frontalis Burmeister.
Head and thorax of ♀, upperside.

Thorax and abdomen luteous brown above, margined with yellow. Underside somewhat paler, that of the prothorax yellow.

Legs slender, rather short, yellowish red with brown annulations and spare black spines. The median and posterior femora with a large black halfring in their middle. Tibialspurs brown, somewhat shorter than the metatarsus.

Abdomen slender, shorter than the wings, with very spare, short, yellowish hairs at the sides of the tergits and at the venter.

Gonopoda yellowish with black spines.

Wings very long and narrow, lanceolate, membrane hyaline, with green or bluish iridescence. Nervature dense, yellowish brown, the longitudinal veins alternating with black. Pterostigma nearly invisible, tips of wings narrow, acute. In rest the tips of the hindwings are about 2 mm. longer than those of the forewings. The pelotte is very small, yellowish hyaline and sessile.

Body 23—26 mm., forewing 23—27 mm., hindw. 23—27 mm., ant. 5—6 mm.
Abd. 18—20 mm., gr. br. 5—6 mm., gr. br. 4—4½ mm.

Habitat: Java.

Burmeister's description is, as in most authors of that time, very short. It also is pretty well applicable to *acer javanensis*, but the distinctive character is, according to the description: „alis posticis in quiete longioribus"; in the last-named species the hind- and forewings are in rest equal in length. The other characters given by Burmeister are applicable to both species.

No other locality as Java is given for the type, which seems not to be in the Halle Museum, as Taschenberg does not mention it. Probably it is in Hagen's collection in Cambridge, Massachusetts.

I have before me a series of 3 specimens from Java, collected by Mr. M. C. Piepers; probably these are collected in Western Java. I further examined specimens from Batavia, collected by Edw. Jacobson in April, August, October and November 1907, and from Tandjong Priok, collected by P. Buitendijk. From Central Java I examined specimens from Semarang, also collected by Edw. Jacobson. One from East Java, collected by Mulié, and two from Ambarawa, collected by Ludeking. I cannot find constant differences between the specimens from eastern and western Java.

Specimens from Alor and Lomblen, in my collection, collected by A. E. Everett in 1897, are different from javanese specimens by somewhat broader tips of the wings.

Specimens from Timor are darker coloured and they are comparatively larger. I examined three specimens from that island, collected by Wienecke in March and December.

Specimens from the island of Wetter, collected by Karl Schädler, are not distinct from javanese specimens.

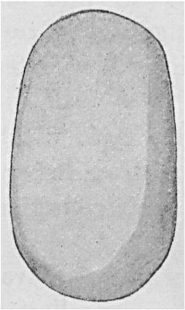
Metamorphosis and biology.

Edward Jacobson kindly sent to me the different preserved stages of the javanese form, and also living larvae from Batavia were communicated to me by our zealous collector P. Buitendijk.

I give here Mr. Jacobson's observations and my owns together.

The egg (fig. 15) is large in proportion to the imago; it has a length of $1^1/_4$ mm. and a breadth of $^3/_4$ mm. It is oval and has a yellowish colour. There is nothing known about the depositing of Myrmeleonid-eggs and these are only known of some three or four species. Mr. Jacobson obtained four eggs from a pinned female.

Fig. 15.



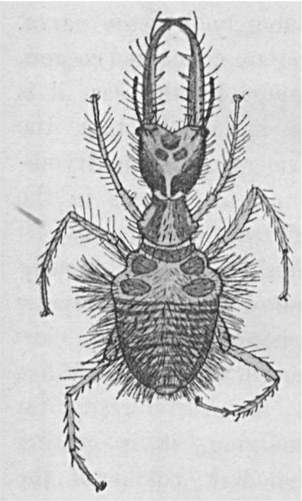
Myrmeleon frontalis Burmeister. Egg.

The newly hatched larva (fig. 16) is about 2 mm. long, its colour is dark brown like the sand in which its lives. The coxae are very long and the tarsi are one-jointed. The head is elongate, the antennae about half as long as the mandibles. The thorax and abdomen are distinctly separated and in the first the three segments are still distinctly developed. The pygidium is very short and nearly oval.

The spines and bristles are very numerous and long.

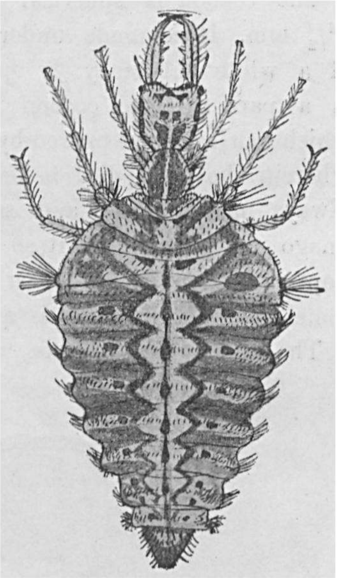
In the other stages the head increases in breadth, the antennae appear somewhat shorter and the two last segments of the thorax form with the abdomen the enormous conical sack on which a curious dark brown pattern is visible on the yellowish brown underground. The black spines are directed forwards and have become very short. The pygidium is trapeziform. The adult stage (fig. 17) is 11 mm. long.

Fig. 16.



Myrmeleon frontalis Burmeister.
Larva, 1st stage.

Fig. 17.



Myrmeleon frontalis Burmeister.
Larva, adult stage.

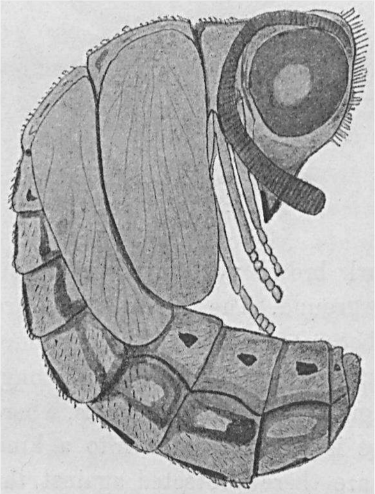
The larvae live near the houses, under the verandas, where the cement of the galeries is weatherbeaten into a kind of brown sand. As they are there protected against the rain, they are often so numerous, that 70 pitfalls were found by Mr. Jacobson on $^1/_4$ M^2. and there would certainly be still more, if this spot had been without stones and other obstacles.

The duration of the metamorphosis is probably about one year, but I have no certainty about this taxation. The indigenous name of them is »Oendoer-oendoer", derived from moendoer = go backwards, after their well known mode of moving.

The cocoon is spherical and has a diameter of about $7^1/_2$ mm. It is made under the dry sand and is spun of a white substancy. It opens by a round cover, which is a part of the cocoon spun loosely by the larva, which can easily be proved by opening a not emerged cocoon, wherein the larva died before pupating. In this case it is always made ready and so it is impossible that the imago or pupa bites it so when emerging, as in Hymenoptera. Though the cover is round and opens in the same way, the principle is quite different.

The pupa (fig. 18) is, when freshly hatched, nearly yellow with brown spots; it is curved and very short length about 6 mm. When it is nearly ready for emerging, it is getting the dark colour of the imago and stretches itself, pushes the round cover, which falls off or rests united with the cocoon by some threads. The empty pupaskin rests half out the cocoon and is hyaline, except the tips of mandibles, which are brown. The pupal stage dures from 2 to 3 weeks. The imago emerges in April and August to November. Its first excrement is a pale grey bar of 3 mm. length and 1 mm. breadth, which is the larval excrement.

Fig. 18.



Myrmeleon frontalis Burmeister.
Pupa.

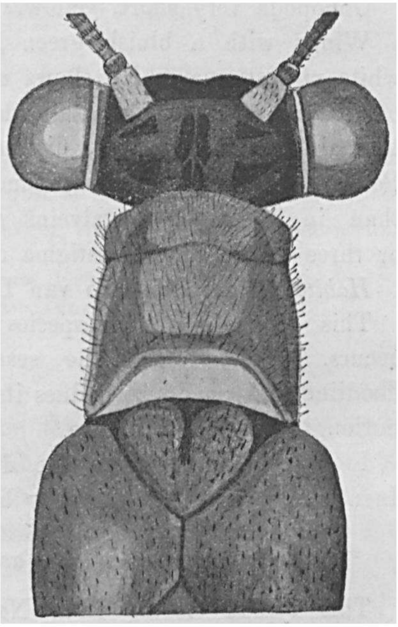
I received many living larvae from Mr. P. Buitendijk, but though some of them pupated, all died in winter.

Myrmeleon acer Walker.

(Plate 3, fig. 14, ♂).

Myrmeleon acer Walker, Cat. Brit. Mus. Neur. p. 348, n°. 78 (1853). N. Holland.
» *solers* Walker, l. c. p. 367, n°. 112 (1853). China.
» *inopinus* Walker, l. c. p. 368, n°. 114 (1853). van Diemensland.
» *hostilis* Walker, l. c. p. 384, n°. 145 (1853). West Australia.
» *celebensis* Mac Lachlan, Tijdschr. Entomol. XVIII, p. 5, t. I, f. 8 (1875). Celebes.
» *iridescens* Kirby, Monogr. Christmas Isl. p. 140, tab. 14, f. 4 (1900). Christmas Island.

Fig. 19.



Myrmeleon acer javanensis, n. subsp. Head and thorax, upperside.

This species is nearly related to *frontalis* and very similar with it, but it is easily distinct from it by the following characters.

Wings in rest equal in length, relatively shorter and broader, tips somewhat broader. Nervature more open.

Body darker fuscous, the head broader, labrum and mouthparts yellow, the two apical joints of the palpi dark brown to black. Eyes surrounded by a very narrow yellow line. Vertex and occiput dark plumbeous grey, with indistinct deep black markings (fig. 19), which are similar with but distinct from those of *frontalis*.

Antennae black, the basal joint yellow at the dorsal side, black beneath; they are shorter than in *frontalis* and with a broader club.

Pronotum deep fuscous, the borders somewhat paler luteous. Meso- and metanotum darker, with narrow luteous hindborders.

Breast luteous brown, often covered by a grey exudation. Legs luteous brown, tarsi black, except the basal joint, which is yellow at its base, tibiae black at the underside, at the tip and at the base. Femora yellow at the basal third, with a broad brown line at the outer side of the apical two thirds. Spurs black, straight, as long as the metatarsus.

Body shorter than the wings, wholly fuscous, equal in length in both sexes, with very narrow yellow lines at the hindborders of the segments of the distal half.

Gonopoda very short, yellow.

Wings with a bluish green iridescence, hyaline, with white pterostigma, which shows more or less distinct traces of a dark patch at its basal side in the forewing. Longitudinal nervature yellow, distinctly spotted with brown. Pelotte very small, brown, somewhat longer pedunculate than in *frontalis*. Costalveins simple, exceptionally two or three before the pterostigma are bifurcate.

Habitat: from China to van Diemensland.

This species forms subspecies in the localities where it occurs. It lives along the seashore, not far from the floodline and no doubt it dues its large geographical distribution to this mode of live.

I only will give here the description of the forms of Insulinde, the others will only be enumerated.

Myrmeleon acer acer Walker.

This typical form, from New Holland, is described sufficiently enough by Walker. He does not mention the pattern of the vertex and as I have not noted it when I examined his type in 1906, I can only give here the difference I found in a specimen from Rockhampton, collected by Mr. Meek, in my collection, comparing it with specimens from Insulinde.

The median black spots of the vertex are connected, so that they form two longitudinal streaks somewhat narrowed in the middle. It agrees however in all other points with Walker's description, so that it may be that the mentioned character is constant for the typical form.

Myrmeleon acer hostilis Walker.

This form is described from West Australia and probably different from the typical form. At present I have however no specimens for comparison at my disposal.

Myrmeleon acer inopinus Walker.

This is the form described from van Diemensland. Probably it is different from the typical form.

Myrmeleon acer novae-guineae, nov. subsp.

This form is nearest related to *acer acer*; it is of the same size and has the median markings of the vertex separated and the lateral anterior and posterior spots much smaller but considerably larger than in javanese specimens.

Body 26 mm., forew. 28½ mm., hindw. 27 mm., ant. 5½ mm.
Abd. 19 mm., gr. br. 7 mm., gr. br. 6 mm.

Habitat: New Guinea.

I examined 3 specimens, all females, one from Dutch North New Guinea, Sentani lake, 17 June—4 July 1903, collected during Prof. Wichmann's New Guinea Expedition, and two from German New Guinea, Astrolabe bay, Stephansort, collected by Kunzmann in 1894, formerly in the collection Neervoort van de Poll (coll. v. d. Weele).

Myrmeleon acer giloloensis, nov. subsp.

This form also remembers *novae-guineae*, but it is somewhat smaller and has relatively broader wings.

It is distinguished by the dark markings of the head, the median ones are narrower and the anterior lateral ones are irregular at their distal border. The posterior ones are rather broader.

Body 22 mm., forew. 26 mm., hindw. 24 mm., ant. 5½ mm.
Abd. 16 mm., gr. br. 7 mm., gr. br. 5½ mm.

Habitat: Halmaheira.

One female from North Halmaheira, collected by Dr. Bernstein.

Myrmeleon acer celebensis Mac Lachlan.

(Plate 3, fig. 14, ♂).

Nearest in size to *acer acer* and *novae-guineae*. The median markings very narrow and distinctly separated, the anterior lateral ones regular, narrow, nearly quadrangular, the posterior ones broad, nearly round.

Body 28—29 mm., forew. 28—30 mm., hindw. 26—27½ mm., ant. 5½ mm.
Abd. 20—22 mm., gr. br. 7 mm., gr. br. 6 mm.

Habitat: Celebes.

I have before me Mac Lachlan's type, a ♂ from Macasser, collected by Mr. M. C. Piepers, a ♀ from Gorontalo, collected by von Rosenberg, and another ♀ from Soemalata, North Celebes, collected by the controller E. E. W. G. Schröder.

Myrmeleon acer javanensis, nov. subsp.

This is a very small and feeble form, nearest related to *celebensis* in the markings of the head, which are still more reduced (cf. fig. 19). The lateral posterior ones are also much reduced and only a little broader than the acutely triangular anterior ones.

Body 22 mm., forew. 22½ mm., hindw. 20 mm., ant. 4 mm.
Abd. 16 mm., gr. br. 5½ mm., gr. br. 4½ mm.

Habitat: Java.

We are endebted for an interesting series of this new form to my friend Edw. Jacobson, who collected them at Moeara Antjol near Batavia in December 1907. He also reared them from the larvae and gave the following biological notes:

The larvae are living in the sand on the seashore of Moeara Antjol near Batavia at about 3 meters from the floodline. They were collected in December and are very similar to those of *M. frontalis* and of the same size but paler yellow, the head with nearly the same pattern, the prothorax with only two dark narrow vittae.

The dark longitudinal line of the body is enlarged to a rhomboidal spot on each tergit and this spot is connected by a broad black transverse line with the row of dark points at each side. The zigzag-line of *frontalis* wants. The pygidium is much shorter and nearly semicircular.

I only saw emerged pupae, which do not differ from those of *frontalis*. The cocoon is of the same form and has a diameter of 7 mm. The imagines emerged in January and February.

Myrmeleon acer iridescens Kirby.

I remember to have seen, two years ago, the type in the British Museum, but I have nothing noted about the pattern of the vertex. Probably it is pretty well distinct from javanese specimens.

Habitat: Christmas Island.

Myrmeleon acer sumatrensis, nov. subsp.

This form remembers *celebensis* in size, but the wings are more acute and narrower, so that it has an aberrant habitus. The markings on the head remember those of *javanensis* in form, but the lateral ones are broader and the median ones are connected.

Body 24—26 mm., forew. 26½—30 mm., hindw. 24—27½ mm.
Abd. 16—20 mm., gr. br. 6½—7 mm., gr. br. 5—6 mm.

Habitat: Sumatra.

I examined two females of which the antennae are broken off, one from Sumatra, collected by Ludeking, the other from Manna, West Sumatra, collected by the late controller M. Knappert (coll. v. d. Weele).

Myrmeleon acer niasicus, nov. subsp.

Most resembling *sumatrensis*, but with more acute wings and of about the same size as *javanensis*. The median markings of the vertex are also connected and very broad in their anterior end. The lateral ones are relatively somewhat broader but of the same form as in *sumatrensis*.

Body 23 mm., forew. 25 mm., hindw. 23½ mm., ant. 4½ mm.
Abd. 17 mm., gr. br. 6 mm., gr. br. 5 mm.

Habitat: Nias.

One female from Lahago, Nias, from the collection Neervoort van de Poll (coll. v. d. Weele) and a female received from the controller E. E. W. G. Schröder, collected on Goenoeng Sitoli, Nias, acq. n⁰. 40, 1908.

Myrmeleon acer solers Walker.

This is the continental form from China, but having no specimens from that locality at hand, I cannot give the distinctive characters.

Myrmeleon nicobaricus Brauer.

Brauer, Verh. zool. bot. Ges. Wien, XV, p. 904; Novara Exp. Zool. Thl. II, Abth. I, Neur. p. 43 (1865). Sambelong, Nicobars.

I have not seen the type of this species and do not know what it may be, but probably it also occurs in Sumatra, perhaps as another subspecies. It seems not to belong to *acer*.

Nymphidae.

This family, which is typically australian, is intermediate between the Myrmeleonidae and the Osmylidae and Hemerobidae. The typical genus *Nymphes* leads over to the first family, the genus *Myiodactylus* Brauer to both latter ones.

Genus *Myiodactylus* Brauer (1866).

Brauer, Verh. zool. bot. Ges. Wien, XVI, p. 991 (1866).

Wings, especially the forewings, very broad and short. The cubiti and postcosta parallel, the former united before the border. Antennae not so long as the half of the forewings, moniliform, each joint with a ring of distinct bristles. Legs short, with short tarsi, no tibial spurs developed. Claws rather long, the areolum bifid and each branch as long as the claw and parallel with it.

Habitat: Australia and New Guinea.

In Insulinde this curious synthetic genus is represented by:

Myiodactylus nebulosus Mac Lachlan.

(Plate 4, fig. 15, ♂).

Myiodactylus nebulosus Mac Lachlan, Ent. monthl. Mag. XIV, p. 85 (1878). New Guinea.

Antennae brown above, yellow beneath, moniliform, with erected short brown bristles. Head elongate triangular, yellow, tips of mandibles black. Occiput and vertex blackish brown in the middle. Eyes goldgreen. Prothorax very narrow and elongate, with a dark claret coloured stripe in the middle. Meso- and metathorax robust, yellowish, dark in the middle. Breast pale yellow with whitish hairs.

Legs stout and rather short, yellowish white, with long pale hairs.

Abdomen yellowish, dorsum with a black median stripe consisting of a series of dark triangles.

Gonopoda yellow. The app. sup. of the male broad and angulated at the tip, the genitalvalve short and semicircular.

Wings short and broad, hyaline, with rounded tips. Nervature mostly yellow, excepted the crossveins, which are suffused with fuscous. Pterostigma deep black, triangular, broadly connected with the foreborder. Costalfield broad in both wings, in the hindwings with simple veins, in the forewings many of them are forked. These furcations are spotted with fuscous, so that there seem to be two alternating rows of points in it. In both wings the marginal veins have this coloration, though rather more irregular. In the ♂ there are still cloudings of the membrane at the hind-margin of the posterior wings and at the outer margin of the anterior ones.

The disc of the forewing has in both sexes many grey cloudings and blackish veins.

Body 16 mm., forew. 25 mm., hindw. 24 mm., ant. 12 mm.
Abd. 9 mm., gr. br. 12 mm., gr. br. 8½ mm.

Habitat: New Guinea and Salawatti.

The type is from Ausus and collected by A. B. Meyer; it is in the Dresden Museum. I examined a female from Salawatti (Dr. Bernstein) and a male from Dutch South New Guinea, van Weel's kamp, June 3rd 1907, collected during the last expedition of Mr. H. Lorentz in the direction of the „Sneeuwgebergte".

Osmylidae.

This family is distinct from the Nymphidae by the longer antennae and by the areolum of the tarsi, which may be absent or, when developed, is small and simple, only slightly incised at the tip. From the Hemerobidae it is distinguished by the well developed radialsector, from which the branches of the discal wingpart emerge.

The larvae live so far as is known in water.

The genera represented in Insulinde are:

Genus *Osmylus* Latreille (1805).

Latreille, Hist. Nat. Crust. Ins. XIII, p. 39 (1805).

Wings rather long and broad, with rounded or acute tips which are not incised at the exterior border of the forewings. Antennae reaching about the middle of the wings. Some species with a tubercle at the middle of the hindborder of the forewing in the male. The legs are short and provided with short, spare hairs. The app. sup. of the ♂ are short and conical.

The genus is represented in Insulinde by 3 species, viz.

diaphanus Gerst., *modestus* Gerst. and *inquinatus* Mac Lachl. The first belongs to the typical group, as *O. chrysops* L., the two latter have in the ♂ a tubercle on the hindborder of the forewing and must probably be ranged in a new genus.

Osmylus diaphanus Gerstaecker.

(Plate 4, fig. 17).

Osmylus diaphanus Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 168 (1893). West Java.

Body small and slender, brown, the antennae yellow, with the two basal joints brown, reaching about the middle of the forewing. Head and body brown or yellowish brown, the legs pale yellow, the arolium black and the claws red-brown. The coxae and trochanters like the breast pitchy brown.

Wings hyaline, very large, with obtusely angulated tips. Longitudinal nervature pale yellow, crossveins brown. The costa in the forewings with numerous small brown spots, the subcosta and radius less spotted with brown, but with three larger brown spots, a small one before the middle, a larger one somewhat beyond the middle and a smaller one surrounding the whitish pterostigma. There are also some small dark points along the gradate veins in the apical part of the discoidal field. The base of the forewing between radius, origin of radial sector and hindborder brown.

Hindwings much narrower, with a dark spot at the pterostigma like in the forewings and some dark spots at the gradate veins. In the basal fourth is a small brown point at the hindborder and a larger triangular transverse one surpassing the cubiti at both sides before the middle. Costalveins very numerous and simple in both wings.

Body 9 mm., forewing 18½ mm., hindwing 17 mm.
Abd. 5 mm., gr. br. 8 mm., gr. br. 6 mm.

Habitat: West Java.

Gerstaecker's type is from West Java and I examined another specimen from the Preanger (West Java) collected by Mr. M. C. Piepers in 1888.

This species is allied to the indian *O. pubicosta* Wlk. but very distinct and certainly not a subspecies of it.

Osmylus modestus Gerstaecker.

(Plate 4, fig. 16, ♀).

Osmylus modestus Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 169, ♂ (1893). West- and East Java.

Quite different from *diaphanus* by the much narrower unspotted wings, where only some crossveins are slightly margined with brown.

Body much stouter, pale brown, with pale yellow legs, the arolium, a median point on the tibiae and the underside of the femora blackish. Antennae yellow, the basal joints darker, rather brown like the mouthparts. Prothorax longer than broad, with long grey and red bristles.

Abdomen of the ♂ with the last segment yellow, the preceding ones brown, with two short, straight, conical app. sup. and a semicircular genitalvalve; brown in the female.

Wings elongate and narrow, equally broad and with obtuse, rather rounded tips. Longitudinal nervature yellowish, the radius and subcosta with long fuscous lines, in the forewings more distinct. Crossveins brown or white, those which are surrounded with brown are very distinct in the forewing and form traces of pale crossbands in the female, in the male they are less distinct. Pterostigma yellowish with some very pale brown markings. In the ♂ only some gradate veins and crossveins at the end of the cubiti in the forewing are dark brown. In the middle of the posterior margin is a pale yellow round tubercle, with three black markings shaped as a cloverleaf. Costalveins very numerous and simple in both wings.

Body 8—10 mm., forewing 15—19 mm., hindw. 14—18 mm.
Abd. 4—6 mm., gr. br. 5—6½ mm., gr. br. 4—5 mm.

Habitat: West- and East Java.

Gerstaecker only described males, as the female has no tubercle and its wings are somewhat darker spotted. I examined a female from Java, previously named by Mr. Snellen van Vollenhoven as *O. variegatus*, and a male from Central Java, Ambarawa, collected by Ludeking. The species is nearly related to the indian *O. conspersus* Wlk. of which *O. tuberculatus* Wlk. is very probably the male, and to *O. interlineatus* Mac Lachl. from India or Natal.

Osmylus inquinatus Mac Lachlan.

Osmylus inquinatus Mac Lachlan, Ent. monthl. Mag. VI, p. 200 (1870). Ceram.

Of the same group as *O. modestus* Gerst. and probably also a subspecies of it. As I have not compared the type-specimen, which is specially compared with *O. interlineatus* Mc. Lachl., likewise unknown to me, I only can give an incomplete description compiled from the original one.

Very characteristic is the golden pattern of the forewing. Antennae yellow, legs pale yellow, anterior and median tibiae with 3 black spots externally. Prothorax stout, rather longer than broad.

Wings rather long, the apex acute, the apical margin straight, membrane greyish hyaline; pterostigmatical region with a black spot on each side. Neuration mostly black, here and there white. Subcosta and radius in the anterior wings whitish, subcostalfield with two short golden transverse fasciae, a point of the same colour between them and two ditto streaks towards the apex. There is a rounded raised spot on the hind margin of the forewing at about one third of its length from the base.

Body 4 lines, expanse of wings 19 lines.

Habitat: Ceram.

The type, a specimen collected by Wallace, is in the British Museum. I have not seen other specimens of this species.

Genus *Berotha* Walker (1860).

Walker, Transact. Ent. Soc. Lond. (2) V, p. 184 (1860).

Antennae much longer than in *Osmylus*, reaching at the pterostigma, basal joint very long and thick.

Wings elongate, with acute, somewhat curved tips and a deep arched excision in the exterior margin below it, especially distinct in the forewing. Only one row of gradate veins in the disc. Legs long and very pilose. Abdomen of the ♂ with long app. sup. Small species.

This elegant and curious genus is represented in Insulinde by:

Berotha piepersi Weele (♂ ♀).

(Plate 4, fig. 18, ♂).

Berotha piepersii Weele, Notes Leyd. Mus. XXIV, p. 214 (1904). W. Java.

Antennae yellow, reaching about the pterostigma of the forewing, basal joint very long, longer than the head, darker at the exterior side, with long yellowish hairs. Head yellowish, with two dark spots on the vertex. Palpi shining black, with yellow annulations.

Prothorax as long as broad, yellow in the middle, the sides darker, with a brown villosity. Meso- and metathorax coloured about as the prothorax, but with less villosity. Breast brown with blackish villosity. Legs rather long and slender, yellowish white, with erected, long, dark grey villosity on tibiae and tarsi, the femora with a whitish villosity. Abdomen reddish brown, with a brown villosity. The male with a pair of long, pointed app. sup.

Wings hamatiform, dark grey, with many yellow brown hairs especially in the forewings and at the apical border. Crossveins black, the longitudinal veins yellowish with dense black points. Costalveins of forewings black and furcated, in the hindwings very short and nearly pointlike. Pterostigma long, yellow, with dark points. In the forewings there are many dark points along the cubiti, lying at the furcations of the vein, and one interrupted line of gradate veins, which line consists of 5 apical veins, which begins at the pterostigma and 3 more basalwards, which lay near the cubiti. In the hindwings are only three black gradate veins in the posterior part.

Body ♂ 7, ♀ 7 mm., forew. 10—11 mm., hindw. 9 mm., ant. 8 mm.
Abd ♂ 4, ♀ 3½ mm., gr. br. 3—3½ mm., gr. br. 2½—3 mm.
App. ♂ 1.

Habitat: Java.

I examined the types, a couple collected by Mr. M. C. Piepers at Rembang. The species is nearly related to *B. indica* Brauer from Ceylon.

Hemerobidae.

This family, which is so nearly related to the Osmylidae that they often are united under the name Hemerobidae, is distinct by the absence of a radialsector parallel with the radius, so that the branches of it, which form the longitudinal veins of the disc of the wing, emerge immediately from the radius. Radius and subcosta are united at the tip. The larvae live on trees and feed on Aphidae etc.

The family is represented by one cosmopolitan genus:

Genus *Micromus* Rambur (1842).

Rambur, Hist. Ins. Neuropt. p. 416 (1842).

To this genus belong rather small insects and it is nearest related to the allied cosmopolitan genus *Hemerobius* L. It is characterised by the narrow costalfield, where the vena recurrens at the base of the anterior wings is not developed (in *Hemerobius* it is very distinct).

Dr. L. Zehntner has published figures and descriptions of species which are useful, preying upon noxious Aphidae ¹). I presume that they belong to *M. pusillus*, but I am not sure of it, as the figures are not sufficiently enough worked out in details.

The following species are known from Insulinde

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1) Mededeelingen van het proefstation voor suikerriet in West-Java te Kagok—Tegal. N°. 49, p. 18 (1898).

Micromus pusillus Gerstaecker.

(Plate 4, fig. 19, ♂).

Micromus pusillus Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 171 (1893). Java.

Very similar to and about of the same size as the european *angulatus* Steph.

Yellowish to fuscous; antennae yellowish, only the basal joints a little darker. Head yellowish, eyes black. Thorax yellowish, dark brown at the sides of the nota, breast pale brown. Legs pale yellow, with two dark points on the anterior and median tibiae. Posterior tibiae but little dilated.

Abdomen pale yellowish in the middle, darker at the sides. Venter yellowish. In the ♂ are a pair of digitiform, yellow app. sup. and a long, twice curved, threadlike penis.

The wings are rather broad with broadly rounded tips. The anterior wings are spotted all over with minute brown atoms and clouds along the veins, and larger ones at the apical- and hindborder. The nervature is pale yellowish. The 5 basal costalveins are simple, the following furcated, in the hindwings all are simple. First row of 5 gradate veins, second of 7, all margined with black or fuscous. There also is a dark spot between the cubiti in the basal fourth of the forewing. The hindwings are hyaline and there only is one exterior row of 8 dark gradate veins.

Body 4½ mm., forew. 6—7 mm., hindw. 5—6 mm., ant. 6½ mm.
Abd. 2½ mm., gr. br. 2½—3 mm., gr. br. 2¼—2½ mm.

Habitat: Java.

I examined the type, a very mature male, in which the colours of the body are altered and described by Gerstaecker as fuscous. It is received from Java (Dr. O. Staudinger). Further I saw specimens from Central Java, Ambarawa, collected by Ludeking, and a series of good preserved females in alcohol, all collected at Semarang by Edw. Jacobson.

Micromus morosus Gerstaecker.

(Plate 4, fig. 20, ♀).

Micromus morosus Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 170 (1893). East Java.

Antennae pale testaceous, except the two basal joints which are brown.

Head fuscous, the vertex testaceous, flat, with an impression in the middle. Palpi brown.

Thorax fuscous, the disc and scutellum of the mesonotum testaceous.

Legs pale testaceous, tips of tarsi brown, posterior tibiae scarcely dilated.

Abdomen fuscous, the last two segments yellowish.

Wings more elongate and narrower than in *pusillus*. Forewing greyish with blue iridescence. Nervature dense, piceous, only subcosta and radius pale yellowish. 9 radial-sectors. The rows of gradate veins parallel, black, each row containing 9 veins. The apical row is bordered with fuscous. Costalveins furcated, excepted the 5 basal ones which are simple.

Hindwings hyaline, broader and more obtuse than the forewings, the borders and basal half with testaceous veins. The apical row of gradate veins piceous.

Body 7 mm., forew. 8½ mm., hindw. 7½ mm., ant. 6½ mm.
Abd. 4 mm., gr. br. 3½ mm., gr. br. 3 mm.

Habitat: East Java.

I only saw the type, a female from East Java, collected by H. Fruhstorfer.

Chrysopidae.

Nearly related to the Osmylidae and Hemerobidae, but distinct by the long filiform antennae, which are longer than the forewings, seldom a little shorter. Colour of the body yellowish to green, the nervature ditto, the subcosta and radius not or seldom united at the tip. Arolium simple.

The eggs of *Chrysopa* are remarkable by the long stalks and are deposed in groups at twigs. Those of other genera are unknown. The larvae live in the same way as those of the Hemerobidae and are also useful.

Numerous species occur in Insulinde and no doubt there will be discovered many more. They belong to the following genera:

Costalfield in the forewings strongly dilated at the base, hindwings much narrower than the broad forewings. Antennae as long as the forewings or a little shorter. *Ankylopteryx* Brauer.

Costalfield of the forewings not much dilated at the base, hindwings not much narrower than the forewings. Antennae mostly longer than the wings . . . . . 1.

1. Male with elongate app. sup. forming a forceps. *Chrysocerca*, nov. gen.

Male with short valvular app. sup. . . . . . . 2.

2. Cubiti parallel, very distinct and united at their tip. 3.

Cubiti divergent towards their tip and not or indistinctly united at their tip. . . . . 4.

3. Large slender species with broad wings, the tip of the united cubiti and that of the united radius and subcosta connected by a curved line of gradate veins in both wings. The wing is distinctly divided into a discal and a very broad marginal part. Antennae very long, much longer than the wings. *Apochrysa* Schneider.

Mediocre species, with the cubiti only distinctly united in the forewings, less distinct in the hindwings, not united by a series of gradate veins, though such are developed as a continuous oblique series towards the tip. Wings narrower, no division of discal and marginal part. *Leucochrysa* Mac Lachl.

4. Body, antennae etc. very stout, antennae as long as or shorter than the wings. Cubital cell divided by a longitudinal nervule into two, nearly equal, quadrate cells.
Nothochrysa Mac Lachl.

Body, antennae etc. more slender, antennae as long as or shorter than the wings. Cubital cell divided into two unequal parts, the anterior one triangular.
Chrysopa Leach.

Genus *Ankylopteryx* Brauer (1864).

Brauer, Verh. zool. bot. Ges. Wien, XIV, p. 899 (1864).

This genus remembers the Hemerobidae by the form of the wings. The anterior pair is broad, angulated or rounded at the tips. Costalfield at the base very broad. Hindwings much narrower than the anterior wings, with very acute tips. Nervature about as in *Chrysopa*. Antennae about as long as the wings. Nothing is known about the metamorphosis.

This genus, that occurs in Africa and India, is represented in Insulinde by the following species:

Ankylopteryx octopunctata (Fabricius).

(Plate 4, fig. 21).

Hemerobius octopunctatus Fabricius, Ent. syst. II, p. 85, n°. 16 (1793). Cochin-China.

„ *candidus* Fabricius, Ent. Suppl. p. 202, n°. 5 (1798). East Indies.

Chrysopa candida Schneider, Mon. Chrysop. p. 161 (1851). — Walker, Cat. Brit. Mus. Neur. p. 274, n°. 83 (1853).

Ankylopteryx candida Brauer, Verh. zool. bot. Ges. Wien, XIV, p. 901 (1864).

Chrysopa punctata Hagen, Syn. Neur. Ceyl. I, p. 483, n°. 74 (1858). Ceylon.

Ankylopteryx punctata Brauer, l. c. p. 901 (1864).

Hemerobius trimaculatus Girard, Ann. Soc. Ent. Fr. (3) VII, p. 163, t. 5, f. 1 (1853). Sumatra.

Ankylopteryx trimaculata Brauer, l. c. p. 901 (1864). — Albarda, Sum. Exp.

Ankylopteryx anomala Brauer, l. c. p. 901 (1864); Novara Exp. Zool. II, p. 35 (1866). Nicobars.

Ankylopteryx sigillaris Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 162 (1893). Java.

Body yellowish green, antennae yellow, about as long as the forewing, the basal joint thicker. Head yellow, eyes blackish brown, a black point at each side of the labrum. Mouthparts yellow, the palpi somewhat dark at the tips of the joints.

Thorax yellow, the mesonotum often with two dark spots. Legs very short, yellow, the tips of the tarsi black and a black annulus in the middle of the anterior and median tibiae. Abdomen mostly brown by the decomposed entrails.

Wings hyaline, nervature yellow. Pterostigma yellow to black. Most of the marginal- and costal veins ending in a fine black point. Most transverse veins clouded with pale fuscous in the forewing, where the following two blackish points often are developed: a large one at the hindborder near the base at the end of the analveins and a smaller one at the base of the internal row of gradate veins. The hindwings are much narrower; with the exception of the pterostigma and some clouded veins, there are no dark markings. The radialsector is not very much curved in both wings. The markings of the wings are larger or partly absent and very variable.

Habitat: India, China to Insulinde.

Ankylopteryx octopunctata octopunctata (Fabricius).

I have not seen the specimens from Cochin-China, but no doubt they belong to this form. The description is very short, but the 3 markings on the forewings and the dark pterostigma of the hindwings justify this name. Also the size (like that of *Drepanopteryx phalaenoides* L.) agrees with this species.

Ankylopteryx octopunctata candida (Fabricius).

This is, judging from the short description, the form of India, which generally is larger than javanese specimens. I saw several examples.

Ankylopteryx octopunctata punctata (Hagen).

After Hagen's description and the materials I saw in the British Museum, this form of Ceylon scarcely differs from that of the continent.

Ankylopteryx octopunctata anomala Brauer.

I have not seen specimens from the Nicobars and cannot say in which characters they may differ from continental or sumatran specimens. Brauer's description seems to be drawn up after a somewhat dark coloured specimen. The specimens from Java and Ceylon, mentioned by Gerstaecker (1893), cannot belong to this subspecies.

Ankylopteryx octopunctata trimaculata (Girard).

This form is nearly related to the javanese *sigillaris*, but it seems to be different by the rounded apex of the forewings. Probably good characters are to be found in the gonopoda, but I have no materials enough on hand to examine them.

Body 8 mm., forew. 12 mm., hindw. 11½ mm., ant. 11 mm.
Abd. 5 mm., gr. br. 5 mm., gr. br. 3½ mm.

Habitat: Sumatra.

I saw a specimen from North East Sumatra, Serdang, collected by Dr. B. Hagen, and a male from Palembang, Sumatra-Expedition.

The type of Girard is from Padang and, after his figure, it is a very mature specimen. The figure is good.

Ankylopteryx octopunctata borneënsis, nov. subsp.

Wings more pointed and narrower than in *trimaculata*.

Body 8 mm., forew. 11½ mm., hindw. 10½ mm., ant. 13 mm.
Abd. 5 mm., gr. br. 4½ mm., gr. br. 3 mm.

Habitat: Borneo.

I examined one specimen from Kuching, purchased from Watkins & Doncaster in 1906 (coll. v. d. Weele).

Ankylopteryx octopunctata sigillaris Gerstaecker.

Much more related to *trimaculata* than to *borneënsis* and only different from the first by the somewhat more distinct angulated tips of the forewings.

Body 8—10 mm, forew. 10½—14 mm., hindw. 9½—13 mm., ant. 12—16 mm.
Abd. 5—6½ mm., gr. br. 4½—6 mm., gr. br. 3—4 mm.

Habitat: Java.

I examined the types and a series of specimens from Ardjoeno (Hekmeyer), Bodjonegoro (Mr. M. C. Piepers), Ambarawa (Ludeking), Semarang and Batavia: November, January and May (E. Jacobson).

Ankylopteryx octopunctata kisserensis, nov. subsp.

This form has about the same size as *sigillaris*, but the forewings are more angulated and pointed at the apex.

Body 8 mm., forewing 12½ mm., hindw. 12 mm., ant. 12½ mm.
Abd. 4½ mm., gr. br. 5½ mm., gr. br. 3½ mm.

Habitat: Kisser.

I examined two specimens collected on the island of Kisser by K. Schädler in 1898. In one of them the dark points of the forewings are very feeble, in the other they are quite absent.

I also saw one specimen from North Celebes, Soemalata (E. E. W. G. Schröder), that probably also belongs to a new subspecies. It has all the crossveins broadly bordered with fuscous. The form of the wings is the same as in *sigillaris*. More material is wanted to distinguish this Celebes-form.

The following species is probably also a form of *octopunctata*.

Ankylopteryx doleschalii Brauer.

Ankylopteryx doleschalii Brauer, Verh. zool. bot. Ges. Wien, XIV, p. 901 (1864); Novara Exp. Zool. II, p. 37 (1866). Amboina.

Body etc. as in *octopunctata* but whitish. Wings narrow, subfalcate. Veins white, with white hairs, costal- and postcostalveins black at the apex. Radialsector, the first crossveins of the disc at the radialsector infuscated in the form of the letter H. The crossveins of the sectores, the gradate veins, the crossveins between the cubiti, a trigonal cell at the hindborder and the marginal veins partly or wholly infuscated.

Body 6 mm., forew. 13 mm., hindw. 12 mm.
gr. br. 5½ mm., gr. br. 3 mm.

Habitat: Amboina.

I have not seen this species, but after the description the Celebes-specimen comes very near to it.

Ankylopteryx polygramma Gerstaecker.

(Plate 4, fig. 22).

Ankylopteryx polygramma Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 161 (1893). Java.

Body etc. yellow, without dark points, the tips of tarsi blackish brown.

Wings longer and relatively narrower than in *octopunctata*. The tips much more acute, especially in the forewings. No black markings except the pterostigma. Radialsector of the forewings strongly curved, so that the cells of the curve are more than twice higher than those between the end of radialsector and radius. In the hindwings the radialsector is scarcely curved and nearly parallel with the radius. Nervature yellow-green. Membrane strongly iridescent. The following veins are distinct and broadly bordered with fuscous in both wings: the apical half of the radialsector, the exterior row of gradate veins and the subcubital marginalveins. Moreover the costalveins on both ends and the subcosta in the region of the pterostigma are blackish in the forewing.

Body 9 mm., forewing 13 mm., hindw. 12½ mm., ant. 12 mm.
Abd. 6 mm., gr. br. 5½ mm., gr. br. 4 mm.

Habitat: Java.

Besides the type I saw very pale specimens from Java, collected by S. Müller, and a quite similar specimen from Sumatra, collected by the same.

Genus *Chrysopa* Leach (1815).

Leach, Edinburg Encycl. IX, p. 138 (1815).

This cosmopolitan genus is characterised by moderately long antennae, which are about as long as or a little longer than the forewings. Wings moderately broad, nearly equal in size. The cubitalcell is triangular and connected at its tip with the ramus divisorius. The cubiti are not united at their tip and rather divergent. Body moderately stout, pale green with some darker points on head and thorax in some species. In one species the wings are coloured with fuscous and dull golden markings, in most others they are hyaline.

The development and biology of some species are known.

The following species occur in Insulinde:

Chrysopa ruficeps Mac Lachlan.

(Plate 4, fig. 23, ♀).

Chrysopa ruficeps Mac Lachlan, Tijdschr. Ent. 18, p. 2, t. I, f. 1—4 (1875). Celebes.

Nothochrysa fervida Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 164 (1893). Java.

A large species, of about the same size as the european *septempunctata* Wesm.

Body yellowish green, darker at the sides and nearly rufous.

Antennae brown, the two basal joints yellow, scarcely longer than the wings.

Head rufous at the labrum, mouthparts and sides, frons orange, yellowish green on the vertex. Eyes dark brown.

Prothorax longer than broad, broadly margined with rufous brown at the sides, and with a narrow yellowish green streak in the middle. Meso- and metanotum paler at the sides. Breast yellow-green, abdomen of the same colour, the tergits darker at the sides. Legs pale yellowish green, the claws and arolium brown.

Wings elongate and rather broad, with distinctly angulated tips, the hindwings with somewhat more acute tips. Membrane hyaline. Nervature moderately open, pale yellowish green. Pterostigma moderately long, of about the same colour. Two nearly parallel series of gradate veins in both wings, consisting in the forewing of 7 and 10, in the hindwing of 6 and 9 veins.

The first crossvein joins the cubitalcell in its apical third. Costalfield scarcely dilated in the forewing.

Body 13½ mm., forew. 17 mm., hindw. 15½ mm., ant. 19 mm.
Abd. 8 mm., gr. br. 6 mm., gr. br. 5 mm.

Habitat: Celebes.

I only examined the type, a ♀, collected in South Celebes, Macasser, by Mr. M. C. Piepers. The javanese form scarcely differs from it.

Chrysopa ruficeps fervida (Gerstaecker).

This form is somewhat smaller, and I saw darker coloured specimens of it. The gradate veins may be one less in each row of the interior series.

Body 11—12 mm., forew. 15—16 mm., hindw. 13—14 mm., ant. 17—18 mm.
Abd. 6 mm., gr. br. 5 mm., gr. br. 4 mm.

Habitat: Java.

I examined Gerstaecker's types from West Java (H. Fruhstorfer), which have nothing to do with *Nothochrysa*, and moreover specimens from Java (S. Müller), from Batavia (Dr. de Gavere) and from Semarang, Buitenzorg and Batavia: April and November (E. Jacobson).

Chrysopa flaveola Schneider.

(Plate 4, fig. 24).

Chrysopa flaveola Schneider, Monogr. Chrysop. p. 75, n°. 5, t. 11 (1851). Java. — Walker, Cat. Brit. Mus. Neur. p. 241, n°. 10 (1853).

This species remembers *ruficeps* by the green nervature of the wings and the dark colour of the antennae. It is distinct from it by its much smaller size and dark exterior side of the basal joint of the antennae.

Body yellow. Head with fulvous palpi. Antennae about as long as the wings, brown, the two basal joints yellow, the first a little broader, with a dark brown line at the exterior side. Prothorax nearly quadrate, somewhat broader than long. Legs yellow, the tips of the tibiae and the tarsi somewhat darker.

Wings hyaline with yellow nervature. Pterostigma pale yellowish green. Tips distinctly angulated, those of the hindwings acute. First crossvein joining the cubitus at the tip of the cubitalcell. Series of gradate veins parallel, 5 in the inner, 8 in the outer row of the forewing; in the hindwing one less in each row.

The species much remembers *jacobsoni*, but the dark transverse line on the face wants and the veins are all yellow.

Body 8 mm., forew. 11 mm., hindw. 10 mm., ant. 13 mm.
Abd. 4½ mm., gr. br. 4 mm., gr. br. 3½ mm.

Habitat: Java.

I saw the type in the Berlin Museum and specimens from Java (Dr. Kobus), Ambarawa (Ludeking), Ardjoeno (Hekmeyer), Semarang and Batavia: April and November (E. Jacobson) and Aroe Islands (v. Rosenberg).

Chrysopa vicina Kempny.

(Plate 4, fig. 25, ♀).

Chrysopa vicina Kempny, Verh. zool. bot. Ges. Wien, LIV, p. 354 (1904). Australia.

Related to *ruficeps* and but little smaller in size, readily distinguished by the dark markings of head and thorax and by the more rounded tips of the wings.

Antennae scarcely longer than the wings, brown, the two basal joints yellow, the first with a brown stripe on the upperside.

Body pale yellow-green, palpi brown at the apical parts of the last joints, two black transverse lines on the face beneath the antennae and two ditto longitudinal ones on the vertex. Eyes blackish brown.

Prothorax shorter than broad, above with two black transverse streaks behind the middle, which are nearly connected with two oblique ones in the posterior angles. Meso- and metathorax, breast and abdomen unicolorous, the latter brownish by decomposition of the intestines in dried specimens.

Wings as in *ruficeps*, but with the tips broader and rounder, so that they are much more obtuse. Nervature green, but the costalveins, analveins and adjoining crossveins to the origin of the radialsector in some specimens darker, nearly black. First crossvein joins the radialsector near the tip of the cubitalcell.

Body 10—12 mm., forewing 14—16 mm., hindw. 12½—14 mm., ant. 17—19 mm.
Abd. 6—7 mm., gr. br. 5½—6 mm., gr. br. 4—5 mm.

Habitat: Australia, Celebes, Java and Sumatra.

I saw a good series of this species and cannot find any character to distinguish subspecies of the different islands.

I examined an australian specimen from Port Darwin (Ned. Ind. Nat. Ver.), and others from North Celebes, Soemalata (E. E. W. G. Schröder), West- and East Java (H. Fruhstorfer), Semarang and Batavia: November (Edw. Jacobson) and Sumatra (Dr. Semmelink).

Chrysopa jacobsoni, nov. spec.

(Plate 4, fig. 26).

Similar in size and colour with *flaveola* but distinct from it by the unspotted basal joint of the antennae and the black triangular obliquely transverse spot at the genae as in *vicina*.

Body grassgreen, in dried specimens pale yellow. Antennae little longer than the forewings, yellow at the base, brown towards the apex.

Head with two oblique, triangular, black spots at the genae, palpi red or brown, the last joint black. Prothorax as long as broad, legs pale yellow, the tarsi annulated with pale brown, claws and arolium brown. Thorax and abdomen unicolorous.

Wings as in *flaveola,* the tips scarcely more obtuse, hyaline, nervature moderately open, pale yellow, excepted the crossveins in the forewing, which are more or less indicated with black. This character is often very indistinct in some individuals. In the hindwing the nervature is always pale. The ramus divisorius joins the cubitus near the tip of the cubitalcell. Gradate veins in the forewings dark, 5 in the inner row, 8 in the outer one.

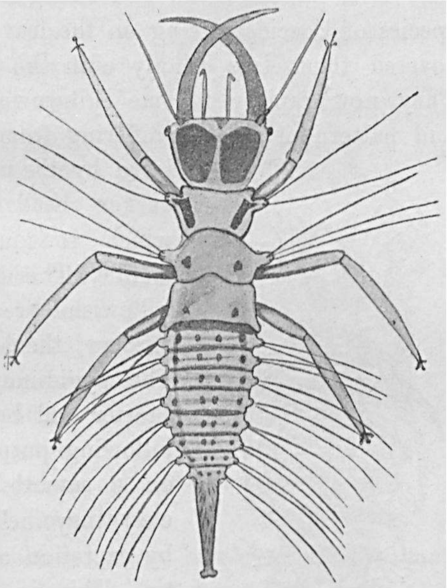
Body 8—9½ mm., forew. 12—14 mm., hindw. 10½—11½ mm., ant. 13—16 mm.
Abd. 5—5½ mm., gr. br. 4—5 mm., gr. br. 3½—4 mm.

Habitat: West Java.

I examined 5 specimens, all reared from the egg in Batavia, November 1907, by Edw. Jacobson, who describes the development of this species as follows:

On October 7th there was found a group of 21 eggs on a bamboo fibre, which hanged off from a bamboo strig in a flowerpot. They have the usual long-stalked form, the eggs are yellowish brown, the stalks hyaline. The eggs were $1^1/_2$ mm. long and 0,3 mm. broad, the stalks 4 mm. long, 0,1 mm. broad, and broader at the foot. Next day three mites were found sucking out the eggs, what proves that the long stalk not always protect them for prey-insects. The joung larvae emerged still the same day. They first rested sitting on the egg-scale, with the tip of the abdomen attached to it and the head turned downwards along the stalk. Such a young larva is represented in fig. 20. It has a yellowish red colour and the dark spots of its body are brown. Interesting are the long antennae, which have the same length as the mandibles, the short dactyliform processes on each segment and the long cylindrical pygidium. The length was about 2 mm. As food they got Ephemeridae, which were attacked immediately and sucked out. Most larvae ran round in a great hurry and covered their body with pieces of egg-scales, fibres and other remnants they could find. They attached these pieces by taking them with the mandibles, then bent the head on the back and put them on the bristles. Probably these objects only fasten by adhaesion, they are not spun on it and there is no sticky fluid on the hairs as nothing of it could be detected under the lens, and with a pencil the objects were easily brushed away, what would not be the case if they were sticked. I once observed that a larva put pieces of a spider's web, which was found on a leaf, on its back, and I presume that this fact, what will often pass in nature, has lead to the wrong supposition that theyselves spin the remnants together.

Fig. 20.



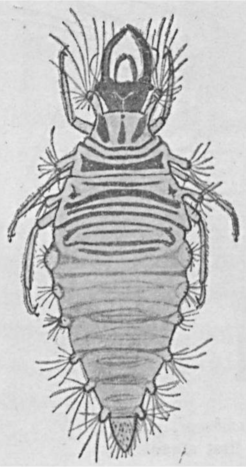
Chrysopa jacobsoni, n. sp.
Larva, first stage.

At the evening of the first and second day, all returned to the egg-scales and rested there in the attitude above mentioned.

On October 12th they did not eat and became slow, they moulted on the 13th. Then they were very glutinous and sucked out many Aphidae. It was interesting to observe how they turned their victims on the tips of their mandibles, to empty them perfectly. One larva was killed and sucked out by its fellows.

On October 17th they moulted for the second time. The moulting specimens become very easily the victims of their moulted comrades. When moulting, the larva makes undulating movements and freshly moulted it rests on its side, waiting till it is dried up. The eyes are always dark, the other parts pale. Their form and colour are now intermediate between the freshly hatched and adult larva; the length is 4 mm. As the larvae eat so many Aphidae that it is impossible to find enough for them, they get a species of Coccidae living on the leaves of *Citrus*, and they covered themselves wholly with the white wax-secretions. They now rapidly become fullgrown and have the form and pattern of fig. 21, differing from the freshly emerged larva by the much shorter antennae, darker head and broader body, which is much enlarged in the middle. The ground colour is now yellowish grey with pale yellow borders; the length is about 7 mm. The pygidium, which has become shorter and broader, is used for the following purpose. When they run on a smooth surface (leaves, glass etc.) they held themselves with it by excretion of a sticky fluid at its tip. This is very clearly to observe when they run on a glass-plate. When irritated they also excrete a drop of it. Probably it is secreted by the same glands, which form the spunyarn for the cocoon. The liquid is yellowish, somewhat sticky and draughts threads. It is never used to attach objects on the back, as I convinced myself repeatedly.

Fig. 21.



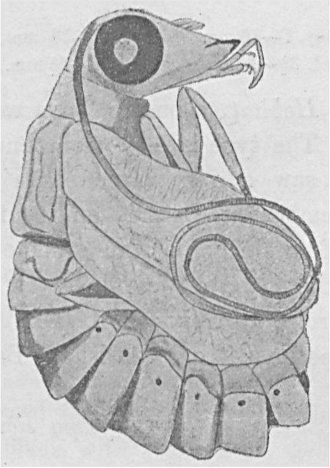
Chrysopa jacobsoni, n. sp.
Larva, adult.

On October 21st three larvae made cocoons which are sphaerical, white, and covered with different objects from their back, mostly the wax-secretions of the Coccidae above mentioned. The lid by which they open it when the imago emerges, is very loosely spun by the larva at 3 sides, so that the imago easily forces it. When opening a box, such a lid was dislocated from the cocoon of a spinning larva, but the larva readily reattached it by spinthreads from its pygidium. The cocoons were attached to leaves or to the sides of the boxes, but were not made in the sand on the bottom. The diameter is $4^1/_2$ mm.

The pupa (fig. 22) has a pale yellow colour, the eyes are brown with a bronzy tinge and the tips of the mandibles brown. There are also traces of the dark stripes on the face. The length is about 4 mm. In the cocoon there were two short cylindrical black excrements of the larva.

On November 3rd and 4th the imagines emerged; they were pale grass-green, but discoloured after death to yellow.

Fig. 22.



Chrysopa jacobsoni, n. sp. Pupa.

The total metamorphosis, after hatching, dures about 28 days.

Chrysopa ochracea Albarda.

Chrysopa ochracea Albarda, Midden-Sumatra, IV, prt. 5, p. 15 (1881). Sumatra.

Related to *flaveola*, but distinct by the pale, not marked palpi and antennae; the colour of the body is pale ochraceous.

Antennae nearly as long as the wings. Palpi and head ochraceous, eyes blackish brown. Prothorax nearly as broad as the head with the eyes. Legs pale ochraceous, the claws scarcely darker.

Wings hyaline, broader and the tips somewhat more obtuse than in *flaveola*. Nervature ochraceous, in some specimens the crossveins are dark. The ramus divisorius joins the cubitus at the tip of the cubitalcell. The rows of gradate veins parallel, the inner one incomplete and very variable in my individuals, varying in the forewings from 0—5 veins, the outer one with 8 veins, which may be somewhat darker.

Body 7—10 mm., forew. 11—13 mm., hindw. 9—11½ mm., ant. 12—14 mm.
Abd. 3¼—6 mm., gr. br. 4—4½ mm., gr. br. 3—3½ mm.

Habitat: Sumatra, Java and Bawean.

The type is a ♂ from Sumatra: Indrapoera (November). I saw a very large series of specimens collected in November at Batavia on the flowers of the „batjang"-tree (Edw. Jacobson), and further specimens from Mt. Ardjoeno (Hekmeyer), West Java (H. Fruhstorfer), West Java: Tandjiroto, 3 Nov. 1883 (Dr. A. C. Oudemans), and a small specimen from the island Bawean (Mr. M. C. Piepers).

Chrysopa signata Schneider.

(Plate 4, fig. 27).

Chrysopa signata Schneider, Monogr. Chrysop. p. 109, n°. 29, t. 35 (1851). Australia.

This species remembers *ochracea* by the pale colour of all its parts, but is easily distinguished from it by the much narrower acute wings and paler colour of the body.

Antennae pale green, scarcely longer than the forewings. Eyes blackish brown. In some specimens the borders of the basal joint of the antennae may be marked with brown.

Wings narrow, with acute tips, the nervature moderately open, pale green, the crossveins darker, often blackish. First crossvein joining the cubitus near the tip of the cubitalcell. Rows of gradate veins parallel, the forewings with 5—8 in both series, the hindwings with 4—6 in the inner, 6—8 in the outer row.

Body 7—8½ mm., forew. 10½—13 mm., hindw. 9—11½ mm., ant. 13½ mm.
Abd. 4—4½ mm., gr. br. 3½—4¼ mm., gr. br. 3—3¾ mm.

Habitat: Australia, New Guinea, Key Islands and Java.

I examined specimens from British New Guinea, Moroka, 3500 ft., October 1895 (Anthony) coll. v. d. Weele; Dutch New Guinea, Sentani Lake, Exp. Prof. Wichmann; Key Islands (H. Rollé, acq. 1906), and one specimen from West Java, Batavia, Jan. 1908 (Edw. Jacobson). I have not seen the type.

Chrysopa crassoneura, nov. spec.

(Plate 4, fig. 28).

Of this remarkable species only two old specimens are known to me. It is easily recognisable by the exterior row of gradate veins of the forewings, which are incrassated as also the adjoining steels of the furcated marginalveins.

Pale yellow-green. Antennae as long as the forewings, brown towards the tip, the basal joint with a brown line at the exterior side. Palpi black with pale joints, genae with a black, once interrupted streak. Eyes black. Thorax and abdomen yellow, the tergits with narrow brown lines at the sides. Legs yellow. Wings elongate, with acute angulated tips, hyaline, with pale green longitudinal nervature, the crossveins darker, rather brown at their ends. The gradate veins parallel, close together, both rows complete in the forewings, and the exterior row much incrassated and also the adjoining steels of the furcated marginalveins, so that there seems to be an oblique yellow-brown streak near the hindborder. Ramus divisorius joining the cubitus at the tip of the cubitalcell. Hindwings but slightly narrower than the forewings, the gradate veins not incrassated and the nervature pale yellowish green.

Body 10 mm.,	forew. 15 mm.,	hindw. 12½ mm.,	ant. 15 mm.
Abd. 7 mm.,	gr. br. 5 mm.,	gr. br. 4½ mm.	

Habitat: Java.

I examined two ♂♂ from Java, collected by S. Müller.

Chrysopa naesonympha Brauer.

Chrysopa naesonympha Brauer, Novara Reise, Zool. I, Neur. p. 39 (1865). Nicobar Islands.

I never saw this form, but judging from the description it seems to be related to *ruficeps*, *flaveola* or another allied species. Probably an allied form occurs in Sumatra. I give here a translation of the diagnosis:

Pale yellowish green. Basal joint of the antennae subcylindrical, the tip at the underside punctated with golden yellow, above with pale brown, second joint globular, pale, annulated with fuscous. Palpi pale, third joint darker, with dark annulations. Yellowish streaks on the front, clypeus, labrum and the foreborder of the vertex yellowish gold.

Pronotum margined with fuscous, yellowish green in the middle. Mesonotum yellow, infuscated at the base of the wings. Legs pale, tarsi short, claws simple.

Wings long and narrow, costalfield very narrow at the base, the ramus divisorius confluent with the first discalvein. Veins green, outer row of gradate veins black.

Body 6—7 mm., forewing 11 mm., antennae 9—10 mm.

Habitat: Kar Nicobar (Nicobar Islands).

According to Brauer this species is related to the european *C. tricolor*. The type is in the Vienna Museum.

Chrysopa splendida, nov. spec.

(Plate 5, fig. 29).

This is a very aberrant species by its spotted wings. Body luteous. Head with fuscous palpi, a black point above between the antennae. Vertex flat, with a brown point in the middle. Antennae luteous, about as long as the wings, the basal joint much incrassated and dark at the lateral side.

Prothorax above with two triangular black spots in the anterior angles and ditto small points in the posterior ones. Mesonotum with two black points at the anterior border and the metanotum with traces of similar ones. Breast yellow, with traces of brown points. Legs rather short and stout, the posterior tibiae somewhat fusiform, pale yellow, the tarsi darker at the tips and a dark point on the coxae.

Abdomen yellowish beneath, the tergits with a broad crescent-shaped fuscous spot at the posterior border, the last three segments yellow.

Wings rather broad, with angulated tips and hyaline membrane, the nervature pale yellow, open. Forewings with the costalveins black, the pterostigma long, luteous, a brown spot at its basal part. Crossveins of the disc all broadly bordered with pale brown, the marginalveins all furcated and alternately yellow and dark brown. The origin of the radialsector and the first crossvein broadly fuscous, so that they form a reversed v-shaped spot. Crossvein entering in the cubitalcell about at its apical third. In the apical part of the disc there are some shining parts of the cells, which are ranged in two rows under the pterostigma and two longer ones along the exterior row of gradate veins.

Hindwings narrower than the forewings, the tips very acute; a fuscous spot at the origin of the radialsector and the 4 costalveins next to it black; a brown point at the base of the pterostigma, the rest of the wing hyaline with yellow nervature.

Body 8 mm.,	forew. 12 mm.,	hindw. 10 mm.,	ant. 13 mm.
Abd. 5 mm.,	gr. br. 4 mm.,	gr. br. 3 mm.	

Habitat: Borneo.

I examined two somewhat damaged specimens from West Borneo, Sengangi, Kelongau, August 1894, collected by Max Moret during the Dutch Borneo-Expedition.

The following subspecies are known to me:

Chrysopa splendida lucasseni, nov. subsp.

This splendid javanese form differs in the following characters from the typical species. Body darker coloured, the dark spots larger. Meso- and metanotum nearly wholly black, the margins yellow.

Wings broader and more intensively coloured. Fore- and hindwings with all the crossveins in the vicinity of the origin of the radialsector fuscous, forming a crossband, which is in the same way, but narrower, developed in the hindwing. Pterostigma half brown, half yellowish, in the hindwings with another brown spot at the tip. At the posterior border of the hindwing are three dark spots, the basal one consists in two fuscous marginalveins, the median one in three ditto and the apical one is a brown spot in the disc, which is juxtaposed to another one under the pterostigma.

The shining golden spots of the forewings are more numerous and form two parallel rows in the apical part of the disc. There are also two spots in the middle and one at the origin of the radialsector.

Body 8 mm., forew. 10½ mm., hindw. 9½ mm., ant. 11 mm.
Abd. 5 mm., gr. br. 4 mm., gr. br. 3 mm.

Habitat: Java.

I examined one male from Tegal, West Java, collected by the late Mr. F. Th. Lucassen, a zealous entomologist to whom I dedicate this interesting form.

Another new subspecies is:

Chrysopa splendida timorensis, nov. subsp.

More related to *lucasseni*, but the crossband at the base of the forewings is only indicated by the black crossveins. In the hindwings it is developed in the same way though somewhat more distinct. The wings are more pointed at the tip, the pterostigma is paler, the crossveins of the disc of the forewing are bordered with pale brown. In the hindwing is a pale trace of the brown spot juxtaposed to the pterostigma.

Body 7 mm., forew. 10 mm., hindw. 8½ mm., ant. 10½ mm.
Abd. 4 mm., gr. br. 3½ mm., gr. br. 3 mm.

Habitat: Timor.

I examined one female from Timor, collected by Wienecke.

Chrysocerca, nov. gen.

Closely allied to *Chrysopa* and having the same plastic characters as this genus. The male, however, has a pair of long curved cerci (app. sup.), which form a long forceps.

Habitat: Java.

The type of the genus is:

Chrysocerca jacobsoni, nov. spec.

(Plate 5, fig. 30, ♀).

Body yellow-green. Antennae somewhat longer than the wings, the basal joint broad, broader than long. Eyes black. Prothorax shorter than broad, anterior border semicircular. Mesonotum with a large black point at each humerus of the wings. Legs yellowish green, rather short, the arolium black. Abdomen short, green, with short green hairs, the male with two long slightly curved pale green cerci.

Wings rather broad, with angulated tips, hyaline, nervature pale green. Pterostigma pale yellow-green, rather short and inconspicuous. Costalfield of the forewings broad at the base, then gradually diminishing towards the apex. First crossveins joining the cubitus in the cubitalcell.

Body 8 mm., forew. 10—11½ mm., hindw. 8½—9½ mm., ant. 15—16 mm.
Abd. 5 mm., gr. br. 3½—4½ mm., gr. br. 3—3½ mm.
App. ♂ 1 mm.

Habitat: West Java.

I examined one ♂ and 3 ♀♀ from Batavia, collected in November 1907 and February 1908 by Mr. Edw. Jacobson to whom I dedicate this species.

Genus *Nothochrysa* Mac Lachlan (1868).

Mac Lachlan, Transact. Ent. Soc. Lond. 1868, p. 195 (1868).

The species of this genus are characterised by the stout body and antennae, which are mostly dark coloured. The wings are narrow, with acute tips and rather open nervature. The cubitalcell is divided into two rectangular cells.

The genus is cosmopolitan. In Insulinde the following species occur:

Nothochrysa aequalis (Walker).

(Plate 5, fig. 31).

Chrysopa aequalis Walker, Cat. Brit. Mus. Neur. p. 266, n°. 67 (1843). ?.
Nothochrysa sumatrana Albarda, Midden-Sumatra, IV, prt. 5, p. 15 (1881). Sumatra.
„ *polychroa* Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 163 (1893). Java.

Antennae reaching about at the pterostigma, black, the two basal joints ferrugineous.

Body stout, testaceous or pale brown. Prothorax with darker sides and four impressed darker spots which are connected by two narrow bands (not always distinct). Meso- and metathorax brown, scutella and hindborders yellow. Abdomen stout and short, dark brown, with the hindborders of the segments and the apical segments entirely testaceous. Legs testaceous, a broad dark brown band somewhat before the tip of the femora, tibiae slightly darker at the tip. Tarsi brown.

Wings very narrow, with acute tips, hyaline, with moderately open yellow-green nervature. Pterostigma very long and narrow, testaceous. In the forewings the 6 basal costalveins, the first crossvein between the cubiti, that between the cub. inf. and postcosta and the origin of the radialsector black. Two complete, straight rows of gradate veins in both wings.

Body 12—16 mm., forew. 18—20 mm., hindw. 16—17½ mm., ant. 17 mm.
Abd. 7—9 mm., gr. br. 5—5½ mm., gr. br. 4½—5 mm.

Habitat: Sumatra, Borneo and Java.

The fatherland of *Ch. aequalis* Wlk. is unknown, probably it is continental, but this is only a supposition.

The following subspecies are scarcely to be distinguished:

Nothochrysa aequalis sumatrana Albarda.

The sumatra-form has a rather larger size, but I find no other differences.

Habitat: Sumatra.

I only saw Albarda's type, a very large female (Palembang), and a much smaller male from Serdang, N. E. Sumatra, collected by Dr. B. Hagen. The ♂ has the femora more broadly dark than the ♀.

Nothochrysa aequalis polychroa Gerstaecker.

(Plate 5, fig. 31).

The javanese form seems to be generally a little smaller than the sumatran one. It also occurs in Borneo and has the size of the small individual, indicated in the table above.

Habitat: Java and Borneo.

I saw specimens labelled Java and Krawang (S. Müller), Borneo (Schwaner) and N. Borneo, Mt. Dulit (coll. v. d. Weele). They do not differ from Gerstaecker's type.

Nothochrysa evanescens Mac Lachlan.

(Plate 5, fig. 32).

Nothochrysa evanescens Mac Lachlan, Ent. monthl. Mag. VI, p. 25 (1869). Sarawak.

I have not seen this form since 1906 and, judging from the description and my annotations, it must be related to *aequalis*. I saw specimens from Sumatra and Java, which are distinct from it by the absence of a dark spot at the basal end of the pterostigma. As to the differences with *aequalis* I refer to the subspecies *ludekingi*. According to Mac Lachlan the body measures 6 lines and the wing-expanse $23^1/_2$ lines.

Habitat: British Borneo, Sarawak.

The type is in the British Museum.

The following subspecies from Java, Sumatra and Kelatoa (island between Celebes and Flores) are known:

Nothochrysa evanescens ludekingi, nov. subsp.

Related to *aequalis*, but readily distinguished by the longer antennae, which are nearly as long as the wings, and by the broader wings, which have a black nervature, the longitudinal veins only are yellow.

Antennae black, the two basal joints yellow. Head and body yellow, the sides of the thorax broadly coal-black. Abdomen black above, last segments and hindborders of the sternits yellow.

Breast yellow, spotted with black. Legs short and slender, coloured as in *aequalis*.

Wings much broader than in *aequalis*, the inner row of gradate veins a little curved. Costalfield of the forewings somewhat more enlarged at the base. All the crossveins black, the longitudinal veins yellow.

Body 16 mm.,	forewing 25 mm.,	hindw. 22 mm.,	ant. 25 mm.
Abd. 9 mm.,	gr. br. 8 mm.,	gr. br. 7 mm.	

Habitat: Sumatra.

I examined two males from Sumatra, collected by Ludeking, to whom I dedicate this subspecies.

Nothochrysa evanescens javanica, nov. subsp.

Much smaller than *ludekingi*. The antennae paler brown. Dark borders of the thorax narrower, with irregular lines towards the middle. Abdomen paler above, yellow beneath. Legs with broader dark bands at the femora and tibiae.

Body 10 mm.,	forew. 17 mm.,	hindw. 15 mm.,	ant. 16 mm.
Abd. 5½ mm.,	gr. br. 5 mm.,	gr. br. 4½ mm.	

Habitat: Java.

I examined a ♂ from Semarang, collected by Edw. Jacobson, and another from Ambarawa, collected by Ludeking.

Nothochrysa evanescens everetti, nov. subsp.

(Plate 5, fig. 32, ♂).

This form is rather intermediate between *ludekingi* and *javanica*. It differs from both by the dark borders of the thorax, which are narrower than in the type but of the same form.

Body 14 mm., forew. 22 mm., hindw. 19 mm., ant. 21 mm.
Abd. 7 mm., gr. br. 6½ mm., gr. br. 5½ mm.

Habitat: Kalao (Kelatoa).

One male from Kalao (Kelatoa, island between Celebes and Flores), Dec. 1895, collected by A. E. Everett (coll. v. d. Weele). This subspecies is dedicated to its collector.

Nothochrysa ferruginea Mac Lachlan.

Nothochrysa ferruginea Mac Lachlan, Ent. monthl. Mag. VI, p. 26 (1869). Sarawak.

Having no specimen for comparison at hand, I only give here a combination of the description and my annotations.

Related to *aequalis*. Body reddish. Head orange, polished; eyes bluish grey. Antennae blackish fuscous, the basal joints reddish orange. Prothorax transverse, above with an impressed longitudinal line in the middle, anterior angles oblique, four large black spots, one at each angle. Mesothorax above with a narrow black line on each side in the front, following the course of the anterior sutures. Legs pale yellowish, with a black marking at the knees. Claws dilated at the base. Abdomen ochraceous, spotted with black above.

Wings hyaline, highly iridescent. Pterostigma elongate, slightly reddish. Longitudinal veins pale yellow, in the forewings the costalveins (except those near the pterostigma), the gradate- and intercubital veins entirely and those between the radius and sector at the two ends, black. Radialsector with 18 branches. Veinlets of the posterior margin simple as far as the inner gradate series, beyond it they are furcate. A black dot at the extreme base of the radius in each wing. Posterior wings with the costalveinlets at the base, gradate veinlets wholly and those between the sector and the radius at the base, black. Body 5 lines, expanse of wings 18 lines.

Habitat: British Borneo, Sarawak.

The type is in the British Museum. It is probably a small specimen of *evanescens*.

Genus *Leucochrysa* Mac Lachlan (1868).

Mac Lachlan, Transact. Ent. Soc. Lond. 1868, p. 208 (1868).

This genus comes by its smaller size and narrower wings nearer to *Chrysopa*. It is easily distinct from it by the very long antennae and the parallel, very distinct cubiti of the forewings, which are distinctly connected at their tip in the disc of the wing. It is distinct from *Apochrysa* by the exterior row of gradate veins, which is oblique and straight and does not distinctly reach the tip of the radius and subcosta; the wings are much narrower.

The genus is known from the tropical regions and is represented in Insulinde by:

Leucochrysa abnormis Albarda.

(Plate 5, fig. 33).

Leucochrysa abnormis Albarda, Midden-Sumatra, IV, prt. 5, p. 16 (1881). Sumatra.

Yellowish green. Antennae longer than the forewings, yellow-green. Head, thorax and abdomen of the same colour. Prothorax with a shining black oval spot at each side. Legs pale yellowish white, the claws rather brown.

Wings moderately broad, membrane whitish hyaline, nervature yellow-green, except the exterior row of gradate veins and about 4 apical and 2 basal crossveins between radius and radialsector, black in the forewings. In the hindwings all the veins are pale yellowish green.

Body 12 mm., forew. 16 mm., hindw. 14 mm., ant. 30 mm.
Abd. 8 mm., gr. br. 6 mm., gr. br. 4½ mm.

Habitat: Sumatra.

I examined Albarda's type, an immature ♂ from Moeara Laboe, November 1877, and a mature one from Sumatra (Ludeking).

The form from Java is:

Leucochrysa abnormis javanensis, nov. subsp.

(Plate 5, fig. 33, ♂).

This form is quite similar with the typical *abnormis*, but all the veins are green, except the exterior gradate veins of the forewing.

Habitat: West Java.

I examined a series from Batavia (February, March, April, July, October and November), collected by Edw. Jacobson, and one ♂ collected by Mr. M. C. Piepers.

Mr. Jacobson also sent me a cocoon from which one of the specimens emerged. It is round, has a diameter of $3^1/_2$ mm. and is fastened at the underside of a leaf. Its surface and the surrounding surface of the leaf are covered all over with whitish flocks, which are probably remnants of Coccidae.

Leucochrysa abnormis lunigera (Gerstaecker).

Chrysopa lunigera Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 160 (1893). Java.

This form from East Java comes nearest to the sumatran form and is different from it by the dark origin of the radialsector and the first nearest crossvein at both sides of it in the forewing. The first crossvein between the cubiti and the last between cub. inf. and analvein are also black.

Body 12 mm., forew. 16½ mm., hindw. 15 mm., ant. 25 mm.
Abd. 9 mm., gr. br. 6 mm., gr. br. 5 mm.

Habitat: East Java.

I only examined Gerstaecker's type, a male, collected by H. Fruhstorfer.

Leucochrysa hexastiche (Gerstaecker).

(Plate 5, fig. 34).

Chrysopa hexastiche Gerstaecker, l. c. XXV, p. 159 (1893). Java.

This species is easily distinguished from *abnormis* and its subspecies by the absence of the dark spots on the prothorax, which is unicolorous yellowish green like the body and legs. The antennae are much longer than the forewings and of the same colour.

The wings have the same form, but the forewings have the following black markings. The exterior row of gradate veins is much darker infuscated and the fuscous colour is somewhat flown out towards the apex along the longitudinal veins. Three apicalveins between the radius and its sector are united by crossveins and darkly suffused with black, and the third marking is the crossvein between postcosta and cub. inf., which latter is broadly bordered with black.

The hindwings have no markings.

Body 10 mm.,	forew. 17 mm.,	hindw. 15 mm.,	ant. 26 mm.
Abd. 6 mm.,	gr. br. 6½ mm.,	gr. br. 5 mm.	

Habitat: Java.

I examined Gerstaecker's type, a female from West Java (H. Fruhstorfer), an immature specimen from East Java, 6000 ft., from the same collector, and a ♂ from Java, old collection, named by Dr. S. C. Snellen van Vollenhoven *Chrysopa longicornis*.

The antennae of both types of Gerstaecker are broken off at the tips, so that the measurement 19 mm. is wrong.

Genus *Apochrysa* Schneider (1851).

Schneider, Monogr. Chrysopid. p. 157 (1851).

To this genus belong the largest and most beautiful species of Chrysopidae. It is nearly related to *Leucochrysa* and also characterised by very long antennae. The wings however are much broader and characteristic by the exterior row of gradate veins, which forms in the forewing a curved line that connects the tip of the united cubiti with that of the united subcosta and radius. In the hindwing this character is less conspicuous. The species remember in their habitus much the genus *Myiodactylus*.

It has the same distribution as *Leucochrysa* and the following species exist in Insulinde:

Apochrysa aurifera (Walker).

(Plate 5, fig. 35).

Chrysopa aurifera Walker, Cat. Brit. Mus. Neur. p. 272, n°. 79 (1853). Ceylon. Hagen, Syn. Neur. Ceylon, I, p. 483, n°. 73 (1858).
Apochrysa aurifera Mac Lachlan, Journ. Entom. II, p. 114 (1866); Journ. Linn. Soc. Zool. IX, p. 270 (1867).

Antennae pale green. Body yellowish green, with purple on the head.

Wings hyaline, with yellow nervature and pale greenish iridescence. The continuous series of gradate veins, that connects the united cubiti with the united subcosta and radius, black. The following inner row may also be darkened in the apical part of the forewing and form a dark spot, but this is only constant for the subspecies. The following, more inner row, has a round black spot about the middle of the wing, which spot is constant. The hindwings are narrower in the basal part, the dark spots are absent, the connecting gradate veins however are black.

Habitat: Ceylon, Celebes, Ceram and New Guinea.

It is of no interest to describe the ceylonese species here, as it does not belong to the fauna of Insulinde. The following subspecies of it are known:

Apochrysa aurifera albardae Mac Lachlan.

(Plate 5, fig. 35).

Apochrysa albardae Mac Lachlan, Tijdschr. v. Ent. 18, p. 3, t. I, f. 5—7 (1875). Celebes.

This is a very large form and distinct from *coccinea* and *phantoma* by the two dark markings of the forewing, the second of which is much smaller, and situated near the apex as an enlarged blackish suffusion of the gradate veins. I saw however a specimen in which it is absent in one wing, being only indicated by the fuscous gradate veins.

The antennae are wholly yellow, the body yellowish to brownish, without markings on the head.

Body 19 mm., forewing 32 mm., hindw. 31 mm., ant. 37 mm.
Abd. 13 mm., gr. br. 14 mm., gr. br. 11 mm.

Habitat: Celebes and Sangir Islands.

I examined the type, a female collected at Macassar by Mr. M. C. Piepers, a specimen from Gorontalo collected by von Rosenberg and another from Taroena, Sangir Islands, collected by Dr. Vorderman.

Apochrysa aurifera coccinea Brauer.

Apochrysa coccinea Brauer, Novara Exp. Zool. I, Neur. p. 30 (1865). Amboina.

Distinct from *albardae* by the absence of the apical black spot in the wings. Head purplish above, yellowish green at the base of the antennae. The latter yellowish, without dark exterior streak at the base.

Body 12 mm., forew. 25 mm., hindw. 24 mm.
gr. br. 10 mm., gr. br. 7½ mm.

Habitat: Amboina.

I have not seen this subspecies. The differences are made up from Brauer's description.

Apochrysa aurifera phantoma Gerstaecker.

Apochrysa phantoma Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 154 (1893). New Guinea.

This form is very nearly allied to *coccinea*, but different by its larger size. The body and head are rather yellowish, a purple rhomboid patch on the vertex. Antennae yellow, with a narrow blackish exterior line from the third to the twelfth joint.

Body 19 mm., forew. 31 mm., hindw. 31 mm., ant. 36 mm.
Abd. 13 mm., gr. br. 14 mm., gr. br. 11 mm.

Habitat: New Guinea.

Gerstaecker's type is from the German territory, Constantinhafen. I examined a specimen from Stephansort, Astrolabe bay, Kunzmann 1894, from Neervoort v. d. Poll's collection in collection van der Weele, and two specimens from the Dutch territory, MacCluer Golf, Sekroe, collected by K. Schädler.

Apochrysa evanida Gerstaecker.

(Plate 5, fig. 36, ♂).

Apochrysa evanida Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 154 (1893). Java.

Much smaller than *aurifera* and certainly a distinct species.

Antennae yellow, the basal joint brown at the exterior side, and this brown stripe is still continued on the basal seventh part of the antennae.

Body yellow, the prothorax with a dark line at the sides. Legs yellowish white, claws brown, a dark brown annulus at the tip of the posterior tibiae.

Wings hyaline, of the same shape as in *aurifera*. The inner row of gradate veins of the forewings not curved in the middle, more straight, with an oval fuscous spot at its base, all the veins fuscous and two crossveins between radialsector and radius, below the pterostigma, fuscous. In the hindwing there is only one fuscous crossvein below the pterostigma. Costalveins simple.

The abdomen has the same colour as the thorax, and is rather brown in dried specimens. The ♂ has a narrow, triangular genitalvalve.

Body 16 mm., forew. 22 mm., hindw. 22 mm., ant. 35 mm.
Abd. 11 mm., gr. br. 9½ mm., gr. br. 7 mm.

Habitat: South West Java.

I only examined the type of Gerstaecker, a ♂ from the Southern Preanger. I doubt if it is really from Java, as I saw in the collection of the Greifswald Museum another specimen of this species which is from Australia.

Apochrysa nicobarica Brauer.

Apochrysa nicobarica Brauer, Novara Exp. Zool. I, Neur. p. 32 (1865).
Jellnschong (Nicobar Islands).

This species appears to be distinct from *aurifera* and its subspecies, as there are also two dark points on the hindwings. I have not seen it. Probably it also occurs in Sumatra.

Body 17 mm., forew. 26 mm., hindw. 27 mm., ant. 30 mm.
gr. br. 12 mm., gr. br. 9 mm.

Habitat: Jellnschong, Nicobar Islands.

The type is in the Vienna Museum.

Nemopteridae.

This particular family, which is tropical or subtropical, is not yet recorded from Insulinde, but no doubt it will be discovered there because several species are known from Australia and India.

Himantopterus fuscinervis, described from Java by Wesmael and recorded by Hagen (1866) as belonging to this family, has since longtime been referred to the Lepidoptera.

Coniopterygidae.

This family of minute insects has been recently studied and monographed by Dr. G. Enderlein at Stettin. The species that occur in Insulinde are:

Coniopteryx javana Enderlein, Notes Leyd. Mus. XXVIII, p. 224 (1907) Java.

Coniopteryx biròi Enderlein, Zool. Jahrb. XXIII, p. 203 (1906). German New Guinea.

Coniocampsa vesiculigera Enderlein, l. c. p. 224, figs. 27, 43, 47—51 (1906). Malacca.

No doubt many species are to be discovered in this interesting group of minute insects.

Mantispidae.

The characteristic anterior legs of this family distinguish them immediately from the other families and give them a very aberrant appearance. They are rather similar with Mantidae and very often both groups are confounded in collections. The antennae are very short and moniliform, scarcely longer than the head. The prothorax is extremely long, often longer than the rest of the body, and dilated in its anterior part; it often bears very characteristic sulci and tubercles. The anterior legs are deformed for preying; they have long coxae, the femur is much enlarged and bears long spines at the underside, the tibiae and tarsi are thin and as long as or shorter than the femur.

The wings are elongate and narrow. The costalfield is narrow and reduced, in the hindwings often absent. The pterostigma is united with the united subcosta and radius and forms one streak with it. The nervature is mostly very open and in the genus *Mantispa* Ill. there is but one row of discalcells in the wings.

The biology is very interesting as the larvae are parasites of Hymenoptera and Spiders and have a very complicated development, hypermetamorphosis. Some species are very similar with some Hymenoptera and are probably copies of their hosts.

The typical genus *Mantispa* Ill. is the only representative of this family in Insulinde.

Genus *Mantispa* Illiger (1798).

Illiger, Käfer Preussens, p. 499 (1798).

The species of this cosmopolitan genus are characterised by the single row of discalcells.

The species of Insulinde are characterised in the following way:

Wings hyaline, with open nervature. Prothorax long, cylindrical, linear, without sulci and tubercles. Antennae moniliform. Small forms . . . . 1.

Wings with coloured membrane, the nervature more dense. Prothorax relatively shorter and thicker, with transverse sulci and tubercles. Antennae rather short and thick. Larger forms . . . . 2.

1. Antennae unicolorous . . . . 3.
Antennae with a pale annulus formed by some pale joints before the tip. *annulicornis* Gerst.

3. Antennae black, pterostigma scarcely broader than the coloured space of subcosta and radius, very similar with *annulicornis* but smaller. *amabilis* Gerst.

Antennae testaceous, pterostigma much broader than the coloured space of subcosta and radius, about of the same size as *annulicornis.* Two rudiments of tubercles at the anterior side of the the prothorax. *manca* Gerst.

2. Wings with a brown streak along the radius and at the tip, nervature rather open. Prothorax with many sulci and four tubercles. 4-*tuberculata* Westw.

Wings hyaline, with a wine-red streak in the costalfield and along the radius, which is broader at the base. Costalfield well-developed in both wings. Nervature rather dense. *strenua* Gerst.

Wings yellowish or fulvous; species of the same size as *strenua* . . . . 4.
4. Wings fulvous, a dark clouding at the apical portion of the inner margin. *simulatrix* Mac Lachl.

Wings hyaline in the middle, the margins yellowish, no dark clouding. *grandis* Guérin.

Mantispa amabilis Gerstaecker.

(Plate 5, fig. 37).

Mantispa amabilis Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 152 (1893). Java.

Antennae black, about 30 joints, the two basal ones testaceous. Head small and rather narrow, yellow, with a black longitudinal stripe on the face, which stripe is connected with a triangular spot between the antennae and a quadrangular one on the occiput.

Prothorax long and narrow, cylindrical, dilated at the tip, yellow at the underside and in the middle of the notum. The sides of it broadly black and at the frontborder broadly connected, including or nearly including a transverse yellow crescent.

Meso- and metathorax brown to blackish, the scutella, two oblique elliptical spots on the mesonotum and a vertical one on the pleurae, testaceous.

Legs pale yellow. Anterior coxae and femora with a brown patch at each side. Median and posterior legs yellow, coxae and trochanters black. Femora in the middle, tibiae at the base and the four last tarsal joints brown. Claws brown, simple, curved.

Abdomen yellowish with lateral black stripes (♂) or wholly black (♀), in the last sex the posterior part of segments 4 to 9 broadly yellow. In the ♂ there are two very short and straight conical appendices superiores.

Wings small, hyaline, nervature very open, black. Pterostigma dark brown, nearly as long as one third of the wing. 6 costalveins. Three cells along the radius, the basal one the longest, the second the shortest. Discus with 7 cells. Marginalveins simple or broadly furcate, so that there is no dense nervature along the margin of the tip.

Body 9—11 mm., forew. 9—11 mm., hindw. 8—10 mm.
Abd. 4—5 mm., gr. br. 2½—3 mm., gr. br. 2¼—2½ mm.

Habitat: Java.

I examined Gerstaecker's types and a series of specimens from Java, Tandjong Priok, December 1907, and Moeara Antjol (near Batavia), April 1908, collected by Edw. Jacobson.

I saw immature specimens the body of which was nearly yellow and the black streak of the face was absent.

From Sumatra I saw a specimen collected in Serdang, Tandjong Morawa, by Dr. B. Hagen. It is somewhat larger, but I doubt if it is possible to distinguish it as a distinct form.

Mantispa annulicornis Gerstaecker.

(Plate 5, fig. 38).

Mantispa annulicornis Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 151 (1893). Java.

Very similar to *amabilis*, but distinct from it in the following points:

Somewhat larger and generally paler coloured. Antennae consisting of 32 joints, black, an annulus of 4 joints before the tip testaceous; basal joints testaceous.

Head testaceous, a brown point on the labrum, another below and above the antennae and two on the vertex, but never a black stripe on the face. The prothorax has the same form and the sides of it are brown, but at the foreborder they are separated by a narrow yellow line in the middle and they never include a yellow crescent. On the back of the thorax there is a continuous yellow middleline and on the abdomen, the sides of the tergits are yellow and only two yellow points on the hindborder of it. The legs are yellow, without dark ring at the femora. The wings are larger, the costalveins are six or some more. There are 10 discalcells with more curved crossveins and between radius and radialsector the first and second are equal in breadth, the third narrower and about one fourth longer. Most of the marginal veins are furcated, so that they are much more numerous than in *amabilis*.

Body 12—15 mm., forew. 10½—15 mm., hindw. 9½—11 mm.
Abd. 5—8 mm., gr. br. 3—3½ mm., gr. br. 2½—3 mm.

Habitat: Java and Bawean.

I examined the type from West Java, a specimen from Semarang (Edw. Jacobson) and East Java (Mulié) and one from Bawean, captured in the wet season (Fruhstorfer), coll. v. d. Weele.

Mantispa javanica Westwood.

Mantispa javanica Westwood, Trans. Ent. Soc. Lond. (2) I, p. 267, n°. 42 (1852). Java.

As I have not seen the type of this species, I have some doubt that it may be distinct from *annulicornis*, as the description is not in all points agreeing with it. The type is surely a large specimen, the forewing having a length of 16 mm. It comes from Java.

From Celebes, Limbotto (von Rosenberg), I saw one specimen, that is a rather larger one, but I find no constant differences with javanese specimens of *annulicornis*. The pale joints of the antennae are rather dark and very inconspicuous.

Mantispa annulicornis stenoptera Gerstaecker.

Mantispa stenoptera Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XX, p. 115 (1888). New Guinea.

This only is the form from New Guinea, which has been described after an immature, reddish coloured specimen. The type is so similar with javanese specimens, that, without more material, I am unable to separate it. I presume that some indian and australian species are also synonyms or subspecies of this form, but I want more materials to work out this question more thoroughly.

Body 14½ mm., forew. 12 mm., hindw. 10 mm.
Abd. 7 mm., gr. br. 3 mm., gr. br. 3 mm.

Habitat: West New Guinea.

The type has been collected by Ribbe. I saw no other specimens.

Mantispa manca Gerstaecker.

(Plate 5, fig. 39).

Mantispa manca Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XVI, p. 39 (1884). Amboina.

Of similar size and form as *annulicornis*, but readily distinct by the pterostigma, which is dilated at the tip. Antennae testaceous, head testaceous with a brown spot on the labrum, on the front and between the antennae. Vertex pale brown, with a narrow yellow cross in the middle.

Prothorax shaped about as in *annulicornis*, but with two short tubercles at one fourth from the front border, which is fuscous on that spot. There also is a broad brown annulus behind the middle and the posterior part is also fuscous.

Meso- and metathorax black above; the scutella, the front border and the humeri yellow. Breast dark brown with numerous yellow spots.

Legs pale yellowish, anterior pair with three pale brown fasciae at the coxae and ditto much darker ones at the femur. In the other pairs the trochanters, a dark annulus near the base of the tibiae, the tip of the tibiae and the last tarsal joint pale brown.

Abdomen black, with the sides of the tergits narrowly yellow and the venter yellowish brown. Wings hyaline, shaped as in *annulicornis* but the nervature more open than in *amabilis*. The pterostigma enlarged at the tip, nearly triangular, dark brown. Nervature black, except subcosta and radius which are yellow. 5 costalveins in the forewings. The three radialcells are equal in breadth, the basal one the longest, the median one the smallest; 8 discalcells.

Body 14 mm., forew. 13 mm., hindw. 11 mm.
Abd. 6 mm., gr. br. 3½ mm., gr. br. 3 mm.

Habitat: Amboina.

I only examined Gerstaecker's type, a female from Amboina (Dr. O. Staudinger).

Mantispa manca papuana, nov. subsp.

Colour of body yellowish. Prothorax with darker spots at the anterior and at the posterior end. Legs yellow, forelegs with the tip of the femora and the base of the tibiae black, in the other pairs only the trochanters slightly darker. Abdomen yellow, the tergits with deep black, u-shaped lines at the hindborders. The male with very short, obtuse, conical app. sup.

Wings as in *manca*, but with 7 discalcells in the forewing.

Body 10 mm., forew. 8 mm., hindw. 7 mm.
Abd. 4 mm., gr. br. $2\frac{1}{2}$ mm., gr. br. 2 mm.

Habitat: New Guinea.

I only examined one ♂ from Dutch New Guinea, collected by Dr. Bernstein.

Mantispa quadrituberculata Westwood.

(Plate 5, fig. 40).

Mantispa quadrituberculata Westwood, Trans. Ent. Soc. Lond. (2) I, p. 264, n°. 39, t. 18, f. 1 (1852). North India.— Walker, Cat. Brit. Mus. Neur. p. 225, n°. 39 (1853).

Antennae thick, black, tips and base bright yellow. Head orange yellow, a shining black transverse line on the face, another between the antennae and a third on the vertex.

Prothorax above with many transverse sulci, with a more strongly marked carina before and behind the middle, each with two obtuse tubercles; anterior part semicircularly dilated in front, yellow, with the anterior margin black and a brown transverse fascia on its hinder parts. Meso- and metathorax dark fulvous with yellow scutella. Breast yellow.

Abdomen dark fulvous beneath, with broad yellow margins of the sternits. Tergits yellow, the sides dark fulvous, the hindborders of the 3rd and 4th black.

Legs reddish brown. Anterior femora with a large black spot at the interior side. Tibiae of the two posterior pairs yellowish white, only darker at the ends. Claws short and broad, with 4 teeth at the end.

Wings narrow with acute tips, nervature moderately open, yellow. A broad longitudinal fulvous streak along and beneath the radius, beginning broadly and gradually diminishing towards the narrow fulvous pterostigma. In the hindwings, this streak is narrower at the base. The apex of all wings has a pale brown streak which ends in the fourth discalcell.

Body 9—12 mm., forew. 8—11 mm., hindw. 8—10 mm.
Abd. 4—7 mm., gr. br. 2—3 mm., gr. br. 2—3 mm.

Habitat: West Java.

I examined a specimen from West Java, collected by Mr. M. C. Piepers, and a series from Moeara Angke near Batavia, collected in April 1908 by Edw. Jacobson.

The latter informs us that it was very common in the swampy region at some hundreds of meters from the coast. They were sitting on the grass and very easily captured with the hand. Their flight was very painful and they only flew about one half meter.

Of a number of specimens, brought home alive in a box, a foreleg was teared off in mutual fights.

Probably this form must be separated from the original form, which is described from North India, but I have no specimens from the continent for comparison and Westwood's description and drawing show no differences.

I saw a small male-specimen from Luzon (Zürich Museum) in which the apical and marginal brown streak of the wings are broadly connected and that belongs to a new subspecies (*luzonica*).

Mantispa strenua Gerstaecker.

(Plate 5, fig. 41).

Mantispa strenua Gerstaecker, Mitt. naturw. Ver. Neu-Vorpomm. und Rügen, XXV, p. 150 (1893). West Java.

This species remembers *quadrituberculata* by the sulcated prothorax, by the antennae and by the coloration of the body, but it belongs to another group, as the hyaline wings are much more densely reticulated and the costalfield is much longer, containing more than 10 veins. Its size is more than twice larger.

Antennae short and thick, the 3 apical and the 2 basal joints yellow. Head broad, yellow, foreborder of the labrum, a transverse stripe on the clypeus, another between the antennae and a fourth on the vertex, deep black. Prothorax dark fulvous. Anterior part much dilated, then a strong dilatation with two rough tubercles. Beyond this dilated portion it is much constricted, which constriction is followed by another dilatation that has many sulci. There is a yellow annulus near the hindborder and two convergent yellow lines reaching from the posterior part to somewhat before the middle.

Meso- and metathorax dark fulvous with yellow scutella and borders. Breast fulvous, spotted with yellow.

Abdomen rufous beneath, yellowish above, the fourth and fifth tergit with blackish at the hindborder. Pleurae fuscous.

Legs fulvous. Anterior femora dark fuscous at the interior side, the tibiae likewise coloured at the exterior side. The median and posterior legs with yellow tibiae and tarsi. Pulvillus very broad, nearly quadrangular; claws short, with four dents.

Wings elongate and rather broad, hyaline with black nervature. Pterostigma wine-red as also the radius, subcosta, the costalfield and the base of the forewing. Costalfield very narrow, with 11 veins in the forewing and 14 in the hindwing. The cells along the radius are equal in breadth, but they are diminishing in length towards the apex. 15 discalcells in both wings.

Body 25 mm., forew. 23 mm., hindw. 20 mm.
Abd. 12 mm., gr. br. 5½ mm., gr. br. 4½ mm.

Habitat: West Java (H. Fruhstorfer).

I only saw the type, a ♀, of this remarkable species.

Mantispa simulatrix Mac Lachlan.

Mantispa simulatrix Mac Lachlan, Ent. monthl. Mag. XXXVI, p. 127 (1900). Borneo.

This species seems to be related to *grandis*. It is briefly characterised as follows:

Antennae long, 55-jointed, black, at the base rufous. Head reddish fulvous, deeply excavated above, with a blunt carina. Prothorax comparatively short and stout; anterior portion, about one third of its length, very much dilated, as broad as the head without the eyes, the anterior margin circular; this dilated portion is followed by a constriction, the posterior portion cylindrical, with two indistinct transverse ridges.

Anterior femora much dilated, without markings.

Wings long and narrow, subacute; colour shining fulvous, paler (almost colourless) at the base of the inner margin; the long, narrow pterostigma and the costal-region generally darker; a long darker clouding at the apical portion of the inner margin, more conspicuous in the posterior and in these wings in addition there is an ante-apical discal cloud placed on the gradate veinlets: in both pairs of wings the inner end of the pterostigma is clouded with blackish brown, which colour is continued on the first interradial veinlet and extends into the discal area in a dilated and irregular manner. Nervature reddish. 13 costalveins in the forewings.

The cells along the radius long and narrow, the 2nd shorter than the 1st and 3rd which are subequal, the latter very narrow. Radialsector with 13 closely placed branches.

Body 20 mm.,	forew. 23 mm.,	hindw. 19 mm.
Abd. 9 mm.,	gr. br. 5 mm.,	gr. br. 5 mm.

Habitat: British Borneo, Sawarak.

This species, of which only the type, a ♀, is known, was collected at Mt. Matang near Kuching in August 1899. It closely resembles a reddish ochreous Braconid, which is common at Mt. Matang at any elevation above 1500 ft.

In the fresh state the sides and ventral surface of the abdomen are pure white, so that when seen in profile the somewhat bulky body appears to be reduced approximately to the size of the body of its model, which also has the ventral surface of the abdomen white coloured.

I am not acquainted with this species, of which a not very clear photograph is given.

In the Zoological Record for the year 1900 it is erroneously recorded as *M. mimetica.*

No doubt it also occurs in Dutch Borneo, as the fauna of that island is nearly generally distributed on it.

Mantispa grandis Guérin.

Mantispa grandis Guérin, in Duperrey's Voyage Coquille, Ins. II, texte 11, p. 196, t. 10, f. 4 (1832). Amboina. — Rambur, Hist. Névropt. p. 433, n°. 4 (1842).

Mantispa guerinii Westwood, Trans. Ent. Soc. Lond. (2) I, p. 255, n°. 25 (1852). — Walker, Cat. Brit. Mus. Neur. p. 220, n°. 25 (1853).

This species, which is only known to me by the description and figure, is nearest related to *simulatrix* from Borneo and *strenua* from Java, and forms probably with them and some other australian species a distinct genus.

Body black. Head broad, black, with white eyes. Prothorax black, rather short and thick, with many deep sulci. Antennae rather long, rufous brown. Meso- and metathorax black, broader than the prothorax. Abdomen as long as the thorax, narrower at the base, black. Legs blackish brown and of the usual form, the median and posterior pair with brown tibiae and tarsi.

Wings narrow and very elongate, hyaline in the middle, broadly bordered with yellowish. Pterostigma and nervature also yellowish. Tips with an indistinct transparent brown spot. Costalveins in the forewing about ten in number.

The following measurements are taken from the figure, which seems to be a little enlarged, as Guérin gives 20 mm. for the body and 49 mm. for the wing-expanse.

Body 23 mm., forew. 26 mm., hindw. 22 mm., ant. 8 mm.
Abd. 9 mm., gr. br. 6 mm., gr. br. 5 mm.

Habitat: Amboina.

Westwood is wrong when changing the name *grandis* in *guerinii*, as there are three *M. grandis* for different species, and, independant from another given by Guérin, Erichson and Burmeister, Guérin's name being the oldest, the others therefore want to be changed.

The Sialidae, which also have been placed in the Planipennia, have been treated by me in the volumes XXVI and XXVIII of this periodical, and must be separated as another order of insects, Megaloptera. They are also thoroughly studied by me in behalf of the „Catalogue Sélys".

The Dilaridae, which are very related to the Osmylidae and often united with them, are characterised by the pectinate antennae and by the long ovipositor of the female. Probably some species are also to be discovered in Insulinde. Their biology is wholly unknown.

By careful collecting and observing many novelties are surely to be discovered of these curious and primitive insects, which are probably the praecurrents of the other orders of holometabolic insects.

Leyden, October 1908.

EXPLANATION OF PLATES 1—5.

PLATE 1.

Fig. 1. *Panorpa angustipennis* Westw. ♂ (enlarged).
„ 2. „ *mülleri ungaranensis*, n. subsp. ♀ (enlarged).
„ 3. „ *pi*, n. sp. ♀ (enlarged).
„ 4. „ *jacobsoni*, n. sp. ♂ (enlarged).
„ 5. *Leptopanorpa longicauda*, n. sp. ♂ (enlarged).

PLATE 2.

Fig. 6. *Formicaleo audax* (Wlk.).
„ 7. „ *schädleri*, n. sp. ♂ (enlarged).
„ 8. *Pseudoformicaleo jacobsoni*, n. sp. ♀.
„ 9. *Episalus zephyrinus* Gerst. ♀.

PLATE 3.

Fig. 10. *Paraglenurus borneënsis*, n. sp. ♀.
„ 11. „ *scopifer* (Gerst.) type, ♀.
„ 12. *Myrmeleon sagax celebensis*, n. subsp. ♂.
„ 13. „ *frontalis* Burm. ♀.
„ 14. „ *acer celebensis* Mc. Lachl. type, ♂.

PLATE 4.

Fig. 15. *Myiodactylus nebulosus* Mc. Lachl. ♂.
„ 16. *Osmylus modestus* Gerst. type, ♀.
„ 17. „ *diaphanus* Gerst.
„ 18. *Berotha piepersii* Weele, type, ♂.
„ 19. *Micromus pusillus* Gerst. type, ♂ (enlarged).
„ 20. „ *morosus* Gerst. type, ♀ (enlarged).

Fig. 21. *Ankylopteryx octopunctata trimaculata* (Girard).
„ 22. „ *polygramma* Gerst. type.
„ 23. *Chrysopa ruficeps* Mc. Lachl. type, ♀.
„ 24. „ *flaveola* Schneider.
„ 25. „ *vicina* Kempny, ♀.
„ 26. „ *jacobsoni*, n. sp. (enlarged).
„ 27. „ *signata* Schneider.
„ 28. „ *crassoneura*, n. sp. type.

PLATE 5.

Fig. 29. *Chrysopa splendida*, n. sp.
„ 30. *Chrysocerca jacobsoni*, n. sp. ♀ (enlarged).
„ 31. *Nothochrysa aequalis polychroa* Gerst.
„ 32. „ *evanescens everetti*, n. subsp. ♂.
„ 33. *Leucochrysa abnormis javanensis*, n. subsp. ♂.
„ 34. „ *hexastiche* (Gerst.).
„ 35. *Apochrysa aurifera albardae* Mc. Lachl. type.
„ 36. „ *evanida* Gerst. type, ♂.
„ 37. *Mantispa amabilis* Gerst. type.
„ 38. „ *annulicornis* Gerst.
„ 39. „ *manca* Gerst. type.
„ 40. „ 4-*tuberculata* Westw.
„ 41. „ *strenua* Gerst. type.

N. B. The figures 2, 12, 13, 14, 21, 31, 32, 33 and 35 are relative to the species as well as to the subspecies.

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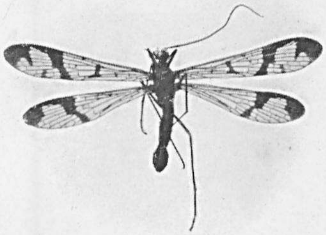

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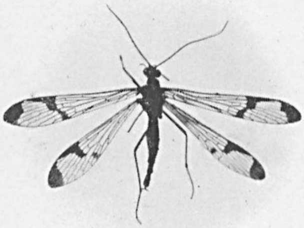

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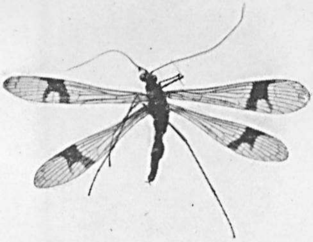

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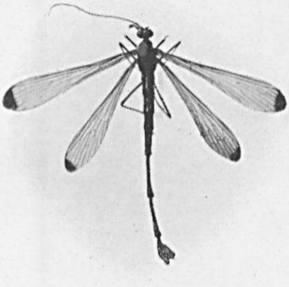

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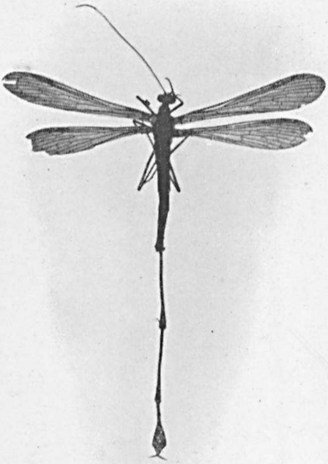
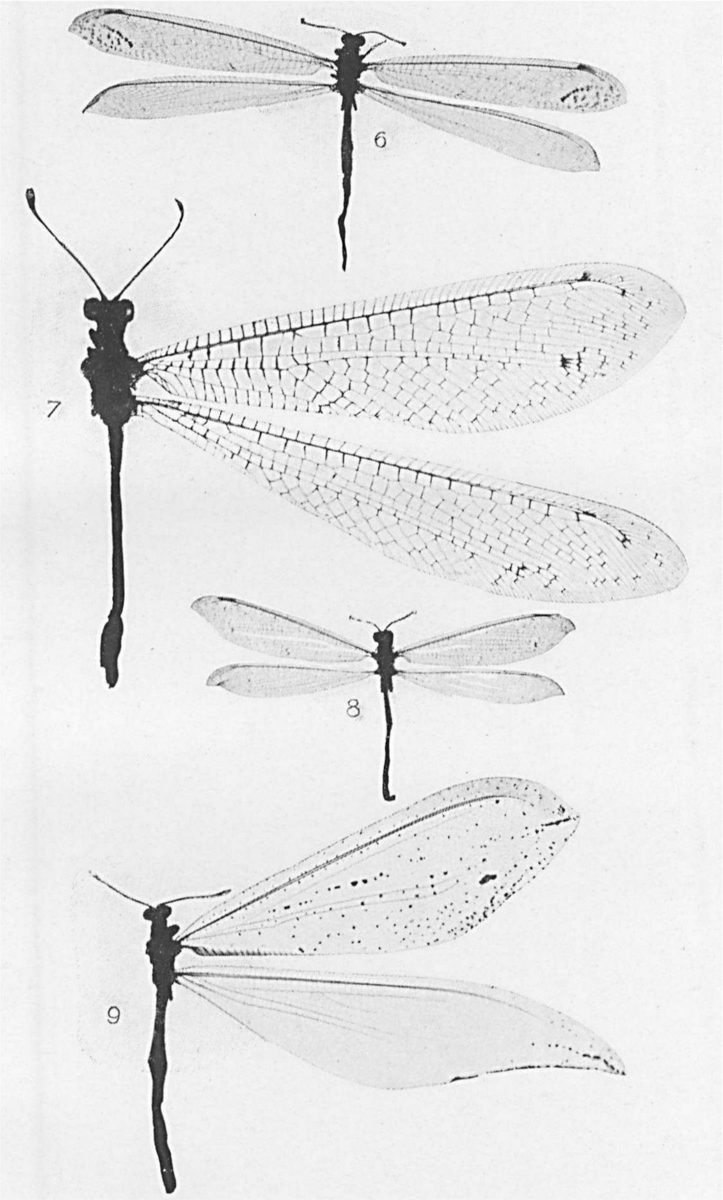


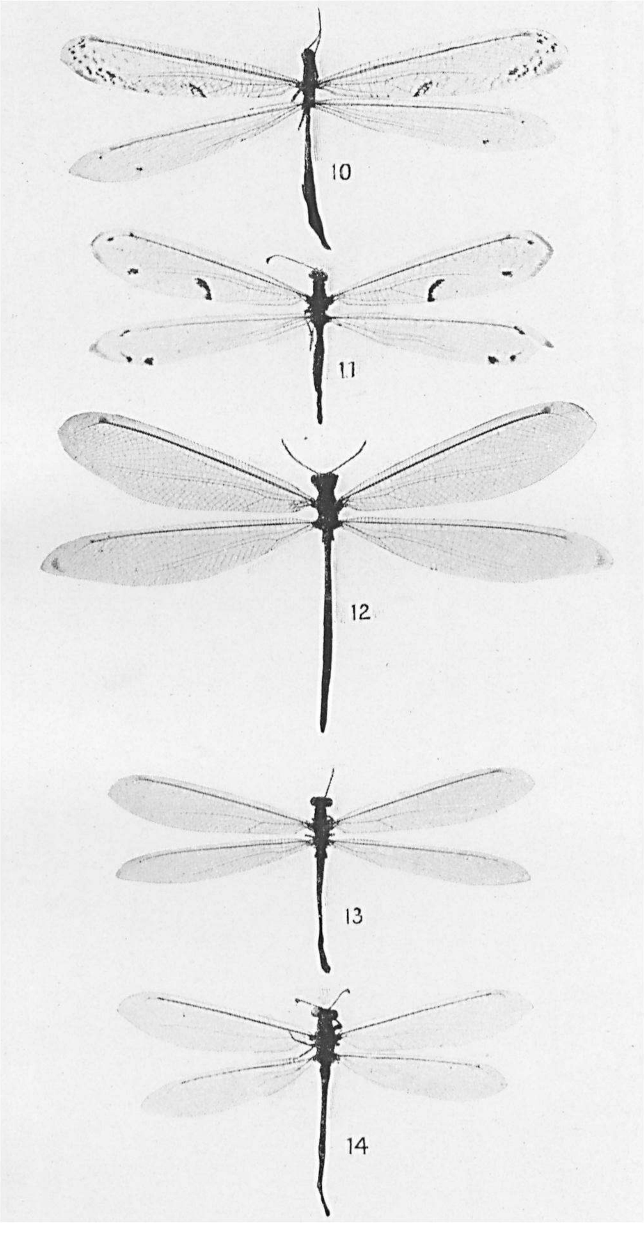
J. C. Wäkerlin phot

Mecoptera of Insulinde.



J. C. WÄKERLIN phot.

Planipennia of Insulinde.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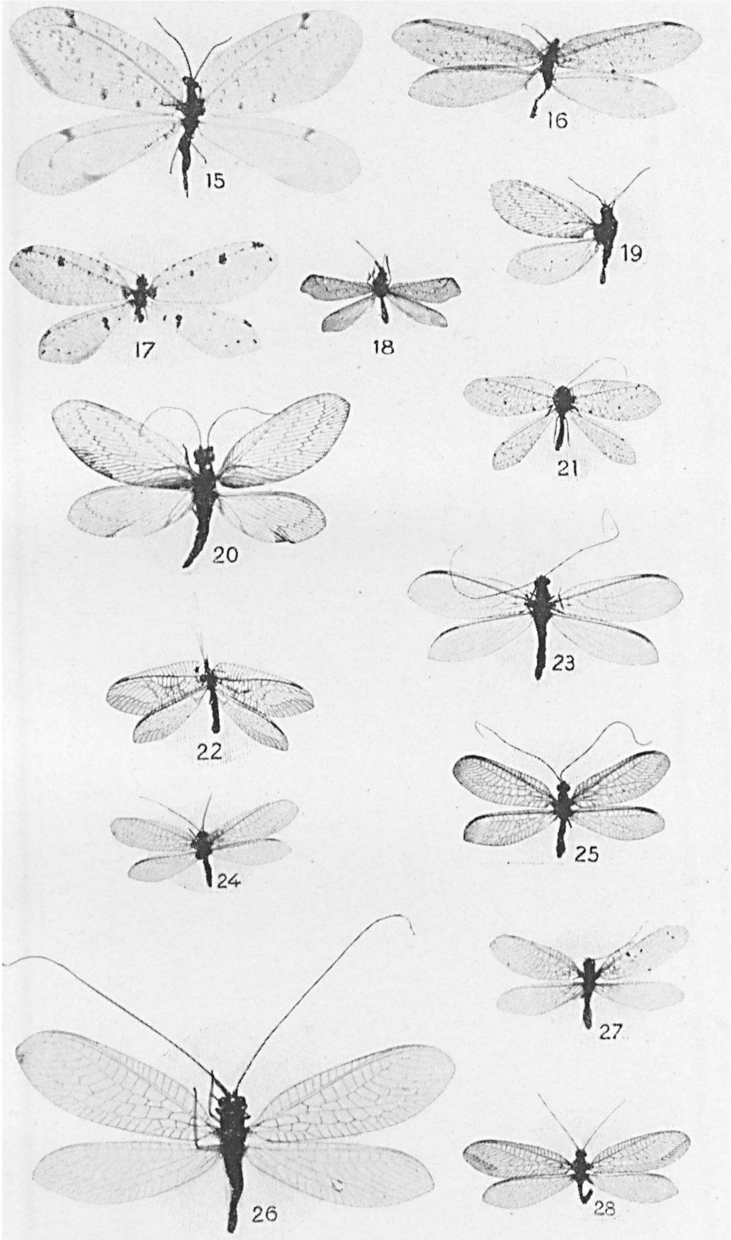
Planipennia of Insulinde.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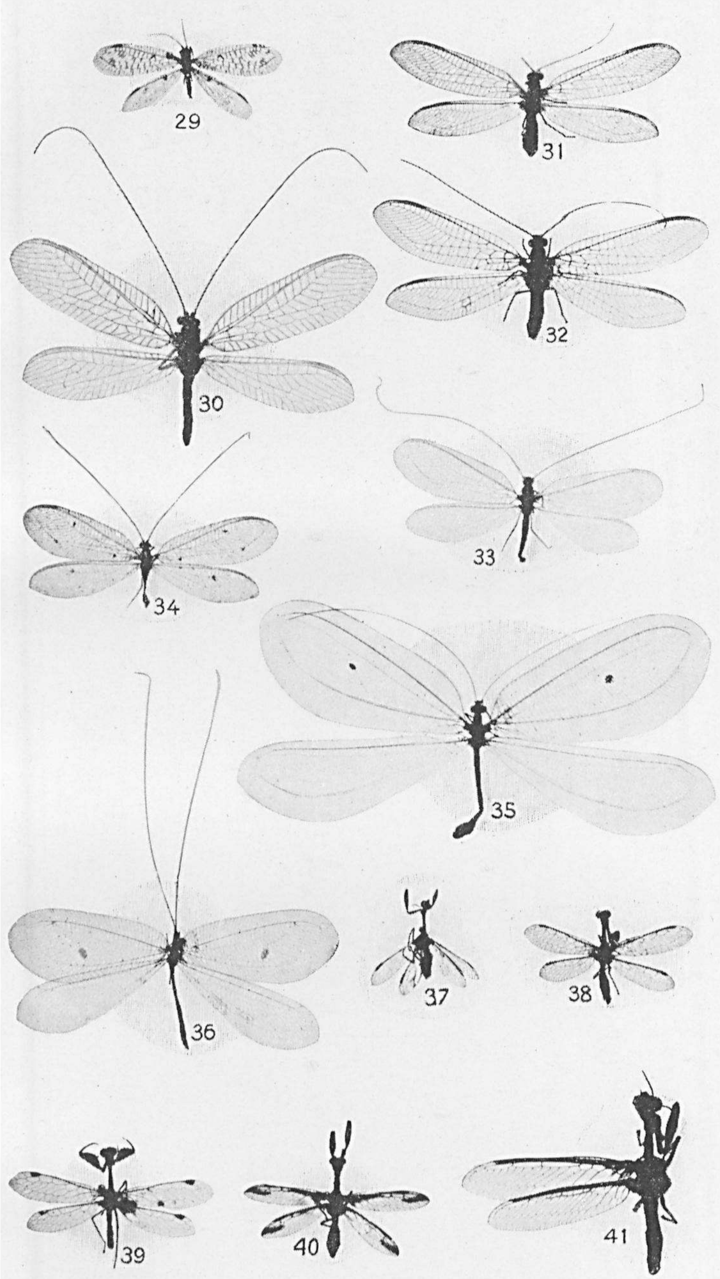
Planipennia of Insulinde.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Planipennia of Insulinde.